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PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Technical Services Division of the Office of Pesticide Programs, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

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77- 2032. Anonymous **Dioxin aftermath** *Chem Week* 120(22): 15; 1977. (no references)

Although it has been almost 11 months after a reactor explosion at an ICMESA chemical plant which spewed toxic dioxin over Seveso, Italy, citizens are plagued with newly developing deformities; dioxin-contaminated foliage and animal carcasses still have not been disposed of; the contamination has spread to areas outside Seveso; and legal actions against ICMESA are proceeding slowly. At least three cases of congenital malformations have been noted. More than 600 cases of suspected chloracne have been documented. Autopsies conducted on 12 people from the region who died since July's explosion show traces of dioxin in their livers. Legal questions are slowing down the entire process. Even so, the president of Hoffmann-La Roche has stated that the company stands ready to shoulder the costs of all proven damages. As for cleanup, fear among the residents that incinerating the contaminated organic material will create another dioxin cloud has stymied the government's plans to build a huge incinerator. The contaminated topsoil is being collected in heaps at the ICMESA factory. To keep it from blowing away, authorities are gluing together the particles of the soil with a polyvinyl acetate emulsion.

77- 2033. Crow, K. D. ; Laporte, J. R. (Dep. Dermatol., Princess Margaret Hosp., Swindon, England, SN1 4JU; Dep. Pharmacol, Univ. Autonoma de Barcelona, Hosp. de Sant Pau, Barcelona 13, Spain) **Effects of dioxin exposure.** *Lancet* 2(8028): 82-83; 1977. (no references)

The extent and effects of dioxin contamination from the explosion at Seveso are debated in a Letter-to-the-Editor and a reply. The attempts to estimate future effects of dioxin exposure in the population near Seveso are often based on exposure of the Vietnamese population from 2,4,5-T spraying and on previous industrial accidents. Previously published estimates of total dioxin amounts sprayed in Vietnam are criticized as inaccurate, and it is stated that more consideration should be given to chronic industrial exposure than to the more dramatic explosions. Experiments performed in Florida are cited in which no adverse effects were seen in animals colonizing a sprayed plot despite the fact that they accumulated appreciable tissue levels of dioxin. The reply points out that industrial exposure does not involve oral ingestion, as does environmental contamination; oral exposure would be more likely to cause hepatic cancer than would inhalation. The numbers of workers exposed industrially might be too low to permit detection of mutagenic or teratogenic effects.

77- 2034. Hay, A. (Author address not given) **Seveso solicitude.** *Nature* 267(5610): 384-385; 1977. (no references)

Political and technical problems arising out of the explosion at the ICMESA chemical plant in Seveso, Italy are reviewed. Progress has been made in the reclamation of the largest residential portion of the contaminated area, but this success has not extended to actual physical destruction of the dioxin present in the contaminated material collected. The methods to handle the problems of disposal are still being debated. Vegetation and soil are being removed. The vegetation is to be incinerated, but it is hoped that the soil will be cleansed by microbial degradation of the contaminant. Some scientists are studying the possibilities of photodegradation of dioxin, solvent extraction of the chemical, or degradation by steam distillation. Residents of Seveso insist that if an incinerator has to be built it should be built somewhere else. The matter of abortion for the women who were carrying children at the time of the explosion or for those who have since been exposed to the dioxin is discussed in view of conflicting reports of the ease of obtaining such medical attention. Medical conditions among the population of the area are mentioned.

77- 2035. Anonymous **Twelve months after Seveso.** *Nature* 268(5616): 90; 1977. (no references)

Two indisputable facts have emerged from the large number of statements made in the press about the accident at Seveso. One is that the venting of the safety discharge of the reactor to the atmosphere was a design fault. The second is that the two-week time period that elapsed prior to evacuation of the population from the contaminated area was excessive; the responsibility for the delay is the subject of litigation. Health effects to date include 106 cases of chloracne, but these patients show no evidence of immunological damage. No evidence of malformation or chromosomal damage has been found in aborted fetuses from exposed women, nor has an excessive number of birth abnormalities been reported. Decontamination methods for the large non-residential area of Seveso are still being debated.

77- 2036. Anonymous **Seveso row.** *Nature* 268(5619): 395; 1977. (no references)

The means of assessing the extent of dioxin poisoning in humans generated heated debate at a NATO-sponsored ecotoxicology workshop. A medical research director for the parent company of ICMESA claimed that chloracne is an obligate sign of dioxin contamination. This statement was disputed by two other Italian conference participants, as was the implication that surveillance of all residents of the contaminated area, not just children, was a waste of time.

77- 2037. Anonymous **TCDD--Seveso.** *Naturwissenschaften* 64(2): 87; 1977. (2 references)

Toxic reaction products from the production of 2,4,5-trichlorophenol were discharged onto the factory grounds and nearby inhabited area during an explosion at Seveso, Italy. Trichlorophenol is mainly used in the production of 2,4,-5-T, but smaller amounts are also used for the preparation of 2,4,5-trichlorophenoxypropionic acid, fenchlorphos, and hexachlorophene. Accidents had previously occurred during 2,4,5-trichlorophenol production in the United States, Ger-

many, and the Netherlands. The exact cause of these accidents is still unknown. During the accidents safety valves or reaction vessels may discharge their contents, and higher levels of TCDD (dioxin) than normal may be present. A total of 2 kg of dioxin is believed to have formed at ICMESA. Dioxin and related compounds are highly toxic. Dioxin is non-volatile and insoluble in water. It is slowly degraded to polar metabolites in moist soil. It is not taken up by plants, and it is generally assumed that contaminated land can be reused after about 10 years.

77- 2038. Seveso-ein Jahr nach der Katastrophe. [Seveso a year after the disaster.] *Naturwiss. Rundsch.* 30(7): 256-258; 1977. (14 references) (German)

The cause of the explosion at the ICMESA factory near Seveso, Italy, which resulted in the discharge of dioxin into the environment, has not yet been explained. The explosion took place after work had stopped for the week end. The designer of the trichlorophenol production apparatus stated that an accident of the type that occurred would have been impossible unless the reactor had been used for a purpose other than that for which it was intended. Accidents of similar type though not as extensive had previously occurred in five of the six large chemical companies which manufactured trichlorophenol. Little or no information was provided to the workers, government authorities, or hospitals concerning the manufacturing process and its possible risks. Givaudan confirmed the possibility of dioxin release after the toxin had been identified at a provincial hospital, two weeks after the accident. Much reliance was placed on the use of expensive and complicated instruments such as gas chromatographs and mass spectrometers rather than simple visual examination of plants for mutation or microscopic observation of soil bacteria. It has been suggested that the production of trichlorophenol be stopped, since safer though more expensive substitutes are available for the products which it is used to manufacture.

77- 2039. Anonymous **Italian poison zone will close factories.** *Water Pollut. Control* 115(7): 6; 1977. (no references)

In the continuing afrermath of the explosion in Seveso, Italy, 19 factories in the area will have to be closed to check for contamination. Dangerous quantities of the poison have been found south of the fenced-in and evacuated zone around in Icmesa firms's plant. The explosion, which occurred last July, sent out a poisonous cloud of dioxin that killed animals, withered foliage, sickened people and forced the evacuation of about 800 residents. The finding of new dioxin has caused additional tension in Seveso, north of Milan, and in nearby towns. It is not clear whether the old pollution had spread or surfaced anew, or whether the original checks were inaccurate.

77- 2040. Suzuki, M. ; Baba, N.; Aihara, M. (Min. Agric. For., Tokyo, Japan.) **[Proceedings of discussion on the proposed law on special measures for controlling pine tree sawyer, at the House Committee of Agriculture, Forestry, and Fishery. Part 1.]** *Noyaku Bijinesu (Agrochem. Bus.)* (286): 2335-2337; 1977. (no references) (Japanese)

A proposal is currently being considered for the control of pine tree sawyer in Japan. From the 450,000 ha of infested pine forests, one million m^2 of pine wood is lost annually. This damage is attributed to the activities of *Bursaphelenchus lignicolus*, mediated by *Monochamus alternatus*. The current control method is aerial application of pesticides. The necessity of field experimentation and emergent control of *M. alternatus* is stressed. The major contents of the proposed law are: the establishment of national control standards and enforcement by prefectural governors; enforcement of existing pest control laws by the Minister of Governors; and environmental protection from the adverse effects of pesticides used against *M. alternatus*. The time limit for the proposal is until the end of the 1981 fiscal year.

77- 2041. Aihara, M. ; Suzuki, M.; Baba, N.; Horikawa, N. (Forestry Agency, Tokyo, Japan) **[Proceedings of discussion on the proposed law on special measures for controlling pine tree sawyer, at the House Committee of Agriculture, Forestry, and Fishery. Part 2.]** *Noyaku Bijinesu (Agrochem. Bus.)* (287): 2343-2347; 1977. (no references) (Japanese)

Tree damage by *Bursaphelenchus lignicolus* is sudden and occurs from mid-summer to autumn in the pine tree forests of Japan. Aerial application of fenitrothion is an effective control. Because 90% of the applied pesticide adheres to the crown of the pine trees, eradication of non-target species in the ecosystem is lessened. A 0.2 ppm residue standard controls the chronic toxicity of fenitrothion.

77- 2042. Suzuki, M. ; Baba, N.; Ito, K.; Aihara, M. (Min. Agric. For., Tokyo, Japan.) **[Proceedings of discussion on the proposed law on special measures for controlling pine tree sawyer at the House Committee on Agriculture, Forestry and Fishery Part 3.]** *Noyaku Bijinesu (Agrochem. Bus.)* (288): 2351-2355; 1977. (no references) (Japanese)

In continuing discussions on the control of the pine tree sawyer in Japan it is stated that although spraying with fenitrothion does have some effects on the ecosystem, the effects are reversed rather rapidly, and such application is the optimal method presently available. The importance of holding discussions with local residents to answer their questions about the treatment is stressed. The insect also carries a microbe which causes additional tree damage.

77- 2043. Lockeretz, W. ; Klepper, R.; O'Leary, D.; Fast, S.; Gertler, M. (Center Biol. Nat. Syst., Washington Univ., St. Louis, MO) **Energy in corn belt crop production.** *Natl. Tech. Inform. Serv.* PB-247,467, 21p.; 1975. (no references)

The study presents data on the quantity and cost of the energy used to produce corn, soybeans, and wheat in the western part of the Corn Belt in 1974. The analysis covers fuel for field equipment, energy required to manufacture fertilizers and pesticides, and energy for drying corn. Corn is

the most energy-intensive of the three crops studied, with soybeans the lowest. The cost of energy for crop production amounts to 11%, 8%, and 6% of the overall direct production costs for corn, wheat, and soybeans respectively. These energy costs come to less than 3% of the value of the crop in all three cases. (Author abstract by permission)

77- 2044. Lockeretz, W. ; Klepper, R.; Gertler, M.; Commoner, B.; Fast, S. (Center Biol. Nat. Syst., Washington Univ., St. Louis, MO.) **A comparison of the production, economic returns, and energy intensiveness of corn belt farms that do and do not use inorganic fertilizers and pesticides.** *Natl. Tech. Inform. Serv.* PB-243,639, 68p.; 1975. (no references)

The report compares crop production on a sample of 16 mixed crop-livestock farms in the Corn Belt on which no inorganic fertilizers and almost no pesticides are used, to that of a matched sample that uses conventional fertilization and pest control practices. In the 1974 crop year, the market value of the crops raised per acre was slightly higher on the conventional sample (an average of 8%), but this difference was not statistically significant at the 90% probability level. There was no difference between the two groups' crop production returns, that is, value of production less operating costs. The energy intensiveness (defined as energy input divided by value of production) on the farms that do not use fertilizers is an average of one-third as much as that of the conventional group. (Author abstract by permission)

77- 2045. Tate, W. (Environ. Prot. Agency, Seattle, WA) **Categorical programs division: Summaries of environmental information sources and services.** *Natl. Tech. Inform. Serv.* PB-245,798, 25p.; 1973. (no references)

The report is a compilation of information centers of computerized data bases and documents accessible to Region X on the following programs: pesticides, radiation, solid waste and noise abatement and control. Most of the information services described in this report are now available for usage. There are others still in a developmental stage and are expected to be operational within a few months. In scope, this report is provided as an additional resource for management effectiveness in program control. (Author abstract by permission)

77- 2046. Miles, G. H. (North Star Res. Inst., Minneapolis, MN) **The federal role in increasing the productivity of the U. S. food system.** *Natl. Tech. Inform. Serv.* PB-246,501, 174p.; 1974. (no references)

The productivity of our food system can be increased by increasing the amount of food that is produced or by improving the nutritional value of the food that is produced; by improving the efficiency of the system that produces, processes, and distributes the food; or by utilizing the food available in a manner that will optimize its total nutritional value. The purpose of this paper is to identify some of the more important factors that affect these three aspects of productivity and to inquire into the effect that public policy might have on these factors. This approach leads to several recommendations of the roles that the federal government might take in increasing our food productivity. This paper provides only an overview of this exceedingly complex system. The areas that have been selected for emphasis are those in which federal actions appear most likely to pay off in increased productivity. (Author abstract by permission)

77- 2047. Teich, I. ; Waters, R. M.; Jacobson, M.; Neumark, S. (Min. Agric. Plant Prot. Dep., Jaffa, Israel) **Reducing the number of insecticidal treatments by mass trapping of *Spodoptera littoralis* in safety belts around host crops in Israel.** *J. Environ. Sci. Health* A12(6): 291-307; 1977. (8 references)

During the 1975 growing season (June-September), traps were baited with the sex pheromone of *Spodoptera (Prodenia) littoralis*, 9,11-TDDA ((Z,E)-9,11-tetradecadien-1-ol acetate). These were distributed in safety belts around 5000 dunams (1250 acres) of cotton, alfalfa, and drupe crops in the Neot Mordechai region of Upper Galilee and 1,500 dunams (375 acres) of cotton, alfalfa and peanuts in the Beth-She'an Valley of Israel. Controls were the unprotected crops in the surrounding areas. Peak captures at Neot Mordechai occurred in August, whereas optimum captures at Beth She-'an occurred in September. The seasonal average captures per trap were 1300 in the Upper Galilee and 350 in Beth She'an, the latter reflecting a lower population density. The number of insecticidal treatments required in the control areas was greater than the pheromone trap protected experimental areas.

77- 2048. Murai, T. ; Igawa, H. (Natl. Inst. Agric. Sci., Kita-ku, Tokyo 114, Japan) **Photodecomposition of Kitazin P .** *Agric. Biol. Chem.* 41(5): 803-809; 1977. (12 references)

The main steps of photodecomposition were observed at the initial stage on the irradiation of ultraviolet light to Kitazin P in a thin film. One was the isomerizàtion to a thionate, *O*-benzyl *O,O*-diisopropyl phosphorothionate, which was gradually hydrolyzed or oxidized to its oxygen analogue. The other step was the cleavage of P-S bond to produce *O,O*-diisopropropyl phosphonate and α-toluenethiol, the latter of which was degraded to produce α -toluenesulfonic acid via dibenzyl disulfide, and finally sulfuric acid and benzoic acid. *O,O*-Diisopropyl hydrogen phosphorothioate, *O,O*-diisopropyl hydrogen phosphate and benzyl alcohol were detected as hydrolyzates. Benzyl alcohol was further oxidized to benzoic acid via benzaldehyde. In addition to these compounds, *O,O,S*-triisopropyl phosphorothiolate, *O,O,O*-triisopropyl phosphorothionate, *O,O,O*-triisopropyl phosphate and benzyl isopropyl sulfide were also detected. (Author abstract by permission)

77- 2049. Berberich, S. M. (Author address not given.) **Tracing the fate of pesticides.** *Agric. Res.* 25(12): 3-5; 1977. (no references)

The use of a laboratory model agroecosystem to permit scientists to simulate field conditions for measuring pesticide residues in soil, plants, water, and air simultaneously, is described. Use of this model overcomes various problems inherent in running similar tests in the open field. Small, well-manicured lawns of Kentucky bluegrass carpet the 15 cm thick soil layer in each chamber of the agroecosystem. The systems can provide accurate pesticide measurements from water leached through the soil and from run-off water, and gage persistence in plant tissue and soil. The systems incorporate a new method of sampling air for pesticide residues. Long-term objectives of scientists using these chambers include the determining of the bioaccumulation of pesticides in terrestrial organisms and hooking up the agroecosystems with other model ecosystems, particularly aquatic models; all in efforts to reduce the pesticide movement in the environment.

77- 2050. Jonsson, V. ; Liu, G. J. K.; Armbruster, J.; Kettelhut, L. L.; Drucker, B. (Div. Health Bur. Public Health Lab. Serv., St. Louis, MO 63103) **Chlorohydrocarbon pesticide residues in human milk in Greater St. Louis, Missouri, 1977.** *Am. J. Clin. Nutr.* 30(7): 1106-1109; 1977. (36 references)

Levels of chlorohydrocarbon pesticides found as residues in human milk in Greater St. Louis, Missouri in 1977 are reported. Of the 51 samples studied, 71% contained *p,p* -DDE which averaged 0.035 ppm. *p,p'*-DDT (average 0.008 ppm) was found in only 4%. The other residues found (with their average concentrations) included: heptachlor epoxide in 24% (0.0027 ppm), BHC in 2% (0.003 ppm), lindane in 4% (0.004 ppm), and heptachlor in 6% (0.019 ppm). The fact that lower DDT levels were found in this current study may give evidence of the effectiveness of the banning of the use of DDT by the Environmental Protection AGency in 1972. The presence of pesticide metabolites in the human milk samples may indicate long term persistence.

77- 2051. Plumb, T. R. ; Norris, L. A.; Montgomery, M. L. (Pacific Northwest For. Range Exp. Stn., Riverside, CA 92507) **Persistence of 2,4-D and 2,4,5,-T in Chaparral soil and vegetation.** *Bull. Environ. Contam. Toxicol.* 17(1): 1-8; 1977. (11 references)

A Southern California chaparral site covered with sprouting chamise (*Adenostoma fasciculatum* Hook, and Arn.) and made up of coarse sandy loam soil was sprayed with the propylene glycol butyl ether esters of 2,4-D and 2,4,5-T at 3.4 kg a.i. in 187 l water per ha. Herbicide residues in plant and soil samples collected 0-379 days later were determined by microcoulometric gas chromatography. Fifteen minutes after application, maximum herbicide concentrations in the plants were 95.2 ppmw of 2,4-D and 92.4 ppmw of 2,4,5-T. Mean levels declined rapidly, 3.8 ppmw of 2,4-D and 2.5 ppmw of 2,4,5-T remaining 379 days after application. Samples of live chamise sprouts, which were not present at the time of herbicide application, contained 0.27 ppmw of 2,4-D and 0.31 ppmw of 2,4,5-T 379 days after application. The sprouts were vigorous and showed no formative effects. In the first 69 days after application, 2,4,5-T declined more rapidly than 2,4-D, but thereafter the rate of loss was similar for the two compounds. The concentrations of 2,4-D and 2,4,5-T in the upper 10 cm of soil were 1.16 and 0.88 ppmw, respectively, 14 days after spraying. Within 69 days, an average of 0.22 ppmw of 2,4-D and 0.29 ppmw of 2,4,5-T remained, and after 379 days, only 0.04 ppmw of 2,4-D and 0.05 ppmw of 2,4,5-T was detectable. The average herbicide concentrations decreased significantly at lower soil depths, and the data suggested that residues in samples below 10 cm resulted from contamination during sampling rather than from leaching. It is concluded that the use of 2,4-D and 2,4,5-T for management of fuelbreak vegetation does not present a significant hazard to the quality of the environment or its inhabitants.

77- 2052. Parejko, R. ; Wu, C. J. (Northern Michigan Univ., Dep. Biol., Marquette, MI 49855) **Chlorohydrocarbons in Marquette fish hatchery lake trout (*Salvelinus namaycush*).** *Bull. Environ. Contam. Toxicol.* 17(1): 90-97; 1977. (4 references)

Fish feed samples and ventral abdominal tissue from 11 sexually mature and 4 immature lake trout (*Salvelinus namaycush*) were analyzed for chlorohydrocarbon content using gas-liquid chromatography. The trout were taken from Michigan's Marquette Fish Hatchery, which uses impounded waters from Cherry creek and is located about 2.5 mi inland from the shores of Lake Superior. Of the chlorohydrocarbons detected in the fish feed, 1-hydroxychlordene was detected in all of the lake trout analyzed and heptachlor was detected in all but one of the samples (97%). Delta-hexachlorocyclohexane and a probable methoxychlor deriva-

tive were also found in the fish, and the latter compound was identified in the feed. *p,p'*-DDE was found in all fish and in the fish feed, whereas *p,p'*-DDD and *p,p'*-DDT were detected in 40% of the trout but not in the feed. The older fish contained significantly more total DDT than the immature fish, but only two fish had concentrations higher than 1 ppm. The older fish also had significantly higher concentrations of PCBs. It is concluded that the lake trout confined to the Fish Hatchery consumed and absorbed chlorohydrocarbons from their diet.

77- 2053. Sullivan, J. F. ; Atchison, G. J. (Purdue Univ., Bionucleonics Dep., W. Lafayette, IN 47907) **Impact of an urban methoxychlor spraying program on the Rouge River, Michigan.** *Bull. Environ. Contam. Toxicol.* 17(1): 121-1226; 1977. (20 references)

Three sampling sites along Detroit's Rouge River (a fairly "typical" urban watershed receiving widespread applications of methoxychlor) were monitored for methoxychlor in the water, suspended solids, sediments, and snails (*Physa gyrina*). Each site was sampled biweekly from March 28, 1974 until September 1, 1974. The samples were analyzed by electron capture gas chromatography and mass spectrometry. No detectable methoxychlor was found by either gas chromatography or mass spectrometry in any of the samples studied. It is concluded that methoxychlor did not reach the Rouge River in detectable quantities.

77- 2054. Stewart, D. K. R. ; Gaul, S. O. (Res. Station, Agriculture Canada, Kentville, Nova Scotia, Canada) **Dihydrochlordene dicarboxylic acid residues in soil treated with high rates of aldrin.** *Bull. Environ. Contam. Toxicol.* 17(6): 712-713; 1977. (3 references)

This study reports residues of dihydrochlordene dicarboxylic acid as determined by gas chromatography in soil samples at intervals of up to 14 years after large amounts of aldrin had been applied to the 15 cm depth in sandy loam soil at two rates, 5.6 and 11.2 kg/ha/yr for 3 successive years. Residues of the chemical increased with depth whereas aldrin and dieldrin residues were negligible below 15 cm. Residues of aldrin and dieldrin in the 0.15 cm depth at 10 years after application were 0.2 and 1.7 ppm, resp. Residues of dihydrochlordene dicarboxylic acid at each depth decreased with time probably due to both leaching and decomposition. Thus dihydrochlordene dicarboxylic acid must be considered a significant terminal residue of aldrin in soil.

77- 2055. Makarov, V. I. ; Sakharov, V. M.; Kutzenogii, K. P. (Inst. Chem. Kinetics, Siberian Branch, Soviet Acad. Sci., Novosibirsk, USSR.) **Residues of insecticides in vegetation and in soil from high dispersed insecticide aerosols.** *Bull. Environ. Contam. Toxicol.* 17(6): 743-751; 1977. (7 references)

This paper presents data of gamma-BHC and *p,p'* -DDT residues in grass, pine-needle, forest layers, soil, and their changes vs time after aerosol treatments with a high power aerosol generator. Residues of *p,p'*-DDT and gamma-BHC in vegetation and soil after high dispersed aerosol applications at distances less than 100 m from the generator path are equal to some tenth of a ppm and to about 1 ppm in grass. But at distances exceeding 500 m the residue concentrations are of the background level and equal to 0.1-0.2 ppm and less. Therefore, applications of high dispersed aerosols contaminate the least. This conclusion is valid both for agricultural and forestry applications, as the amount of insecticidal residues in field and in forest grass after the aerosol applications was nearly the same. It was shown that, to reduce a population of deleterious insects to low levels, considerable deposits of insecticides on vegetation are not necessary.

77- 2056. Khare, M. ; Dondero, N. C. (Cornell Univ., Coll. Agric. Life Sci., Lab. Microbiol. Ithaca, NY 14853) **Fractionation and concentration from water of volatiles and organics on high vacuum system: examination of sanitary landfill leachate.** *Environ. Sci. Technol.* 11(8): 814-819; 1977. (27 references)

A high vacuum system developed to isolate, fractionate, and concentrate trace components from aquatic environments is applied to examine sanitary landfill leachate and other waters. Water samples are connected to a high vacuum system (10^{-6} mm), and the complex mixture of vapors (water, organics, inorganics, and gases) is pumped through a series of traps, maintained at successively lot temperatures in the range from 0 to -268.6 C. The vapor pressures drop to negligible values at the various low temperatures, resulting in fractionation and trapping of volatiles. The volatiles on IR, GC, MS, and GC-MS analysis give a series of organic compounds and gases. The nonvolatile fraction is examined for metals, organic carbon, and substances of possible use as nutrients for microorganisms.

77- 2057. Kiril'chuk, P. P. ; Tsapko, V. G. ((Sci. Res. Inst. Indust. Hyg. Occup. Health, Kiev, USSR).) **Gigiena truda pri primenenii pestitsidov v khmelevodstve [Hygienic data on the use of pesticides in hop growing.]** *Gig. Sanit.* (3): 94-95; 1977. (4 references) (Russian)

The working conditions on hop plantations using pesticides and the dynamics of the pesticide content in the environment were studied. The phosphorganic pesticides phosphamide and methylmercaptofos are sprayed on hops from the ground and air (from helicopters). The conditions of hop cultivation (great length and closeness of rows, 7-meter growing height) favor formation of longlasting aerosols from pesticides sprayed in the air, which contributes to a complex of undesirable working conditions, including: high temperature, humidity, dust level, CO level, noise, exposure to pesticides through touch and inhalation, and strain from operation of ground sprayers. The phosphamide content in the air in the cabin of helicopters exceeds the 0.5 mg/m^3 limit (it is 0.86 mg/m^3). Studies showed that phosphamide completely disappears from the plantation air, from an initial level of 0.52-0.77 mg/m^3, in 6-7 days after ground spraying, and 9 days after

air spraying; methylmercaptofos disappears 0-11 days after ground spraying. Phosphamide was found at a distance of 1100 m at a concentration of 1.8 mg/m³ in the air, and 0.08 mg/m³ on plants, and methymercaptofos at a concentration of 0.54 mg/m³ in the air and 0.18 mg/m³ on plants. Such spreading threatens pollution of water reservoirs, other crops, and air of nearby populated zones.

77- 2058. Hiroshima Prefect. Agric. Exper. Stn. (Higashihiroshima, Hiroshima, Japan.) **[Survey based on the countermeasure of pesticide residues.]** *Hiroshima-ken (Annu. Rep. Hiroshima Prefect. Agric. Exper. Stn.)* 24.; 1975. (no references) (Japanese)

Method, pesticide dosage and crop were combined in pesticide residues studies as follows: quinomethionate and tomato in 20 combinations, chlorfenvinphos and prematured soya bean in 64, various combinations and cyanofenphos and Japanese radish in 40 combinations, as well as a combination of soil and cyanofenphos. As a rule, increased frequency of application increased quinomethionate residues in tomato. In all plots of prematured soya bean, chlorfenvinphos was found in all pods, of apenatured and beta-chlorfenvinphos seemed to leave higher residues than the alpha-isomer. However, the residue in seeds was below the detection limit. It took a relatively long time for cyanofenphos in Japanese radish roots to disappear; however, the residue in their leaves diminished with time.

77- 2059. Hiroshima Prefect. Agric. Exper. Stn. (Higashihiroshima, Hiroshima, Japan) **[Survey on pesticide residues in soil.]** *Hiroshima-ken (Annv. Rep. Hiroshima Prefect. Agric. Exper. Stn.* 24-25; 1975. (no references) (Japanese)

The actual status of Kitazin P (*O*-ethyl diphenyl phosphorodithiolate, a fungicide used against rice blast) in paddy field soil was surveyed. The residue of Kitazin P in a heavy clayed soil at harvest (46 days after application) was about 50% of that just after application, while in a sandy soil with a large amount of water leaching, the soil residue at harvest (50 days after application) had declined to about 7% of that just after application. However, based on the dose rates at the two points, 590 g/10 are and 3060 g/10 are, the absorption rate was 0.59% in rice straw and 0.34% in the rice ears in the former, and 0.57 and 0.29% in the latter. Thus there was no apparent difference due to the soils at both points.

77- 2060. Attri, B. S. ; Lal, R. (Indian Agric. Res. Inst., New Delhi, India). **Effect of washing and cooking on the residues of ethyl and methyl parathion on cauliflower and cowpea.** *Indian J. Agric. Sci.* 44(12): 816-818; 1974. (10 references)

The effects of washing and cooking on the residues of ethyl and methyl parathion in cauliflower and cowpea were investigated. When cauliflower was treated with ethyl and methyl parathion at about 0.35 kg per ha at the bearing stage, the residues of ethyl parathion persisted above the tolerance limit of 1 ppm for 6 days and those of methyl parathion for 4 days. Washing followed by cooking during this period resulted in 40 to 65% reductions in the residues of both compounds. Washing and cooking could not bring the residues below the tolerance limit, except in some marginal cases where the residues were not more than 1.5 ppm. When cowpea was treated with the same insecticides at the same dosage and stage, the residues of both chemicals persisted above 1 ppm for only 1 day. Washing and cooking the pods during this period resulted in 65 to 70% reductions in both the pesticides, bringing the residues below the tolerance limit.

77- 2061. Zwick, R. W. ; Kiigemagi, U.; Fields, G. J. (Oregon State Univ., Dep. Agric. Chem., Corvallis, OR 97331) **Residues of dimethoate and dimethoxon on sweet cherries following air carrier application.** *J. Agric. Food Chem.* 25(4): 937-940; 1977. (7 references)

Dimethoate was applied to sweet cherries at two Oregon locations using both the emulsifiable concentrate and the wettable powder formulations. The applications were made with an air carrier sprayer at rates ranging from 1.23 to 2.50 lb of active ingredient/acre. Only traces of dimethoate and its principal metabolite, dimethoxon, were present at harvest, 28 to 35 days after treatment. Total residues were reduced to levels below 2 ppm in 0 to 8 days after application. No differences in the initial residues or the rate of disappearance were observed between the emulsifiable concentrate and wettable powder formulations. This study indicates that dimethoate can be used for western cherry fruit fly control without excessive harvest residues. (Author abstract reprinted by permission of the American Chemical Society)

77- 2062. Soderquist, C. J. ; Bowers, J. B.; Crosby, D. G. (Univ. California, Dep. Environ. Toxicol., Davis, CA 95616).) **Dissipation of molinate in a rice field.** *J. Agric. Food Chem.* 25(4): 940-945; 1977. (25 references)

The dissipation of the herbicide molinate (*S*-ethyl hexahydro-1*H*-azepine -1- carbothioate) in a California rice field was investigated. Laboratory experiments indicated that while dilute aqueous solutions of molinate were stable in sunlight, irradiation in the presence of tryptophan resulted in decomposition primarily to 1-[(ethylsulfinyl)carbonyl]hexahydro-1*H*-azepine, *S*-ethyl hexahydro -2- oxo-1*H*-azepine -1- carbothioate, and hexamethyleneimine. Analysis for molinate and its degradation products at sub-ppm levels in water, soil, and air samples collected from a commercially treated field, together with laboratory studies, showed that volatilization of molinate from water was the primary mode of dissipation, although photodecomposition products were present in field water. (Author abstract reprinted by permission of the American Chemical Society)

77- 2063. Smith, A. E. (Agric. Canada, Res. Stn., Regina, Saskatchewan, S4P 3A2, Canada). **Degradation of the herbi-**

cide dichlorfop-methyl in prairie soils. *J. Agric. Food Chem.* 25(4): 893-898; 1977. (6 references)

The degradation of the herbicidal ester [^{14}C]dichlorfop-methyl was studied in moist nonsterile heavy clay, silty clay, and sandy loam at 20° C. The soils were extracted at regular intervals with aqueous acidic acetonitrile and radiochemical procedures were used to monitor the herbicide breakdown. On all soils an initial and very rapid hydrolysis to the corresponding acid was followed by a much slower hydrolytic process so that traces of the ester could still be detected after 10 weeks. In all cases the major breakdown product was the acid which degraded more quickly in the heavy clay and sandy loam than in the silty clay. With time, the acid appeared to undergo a strong binding or complexing to the soils from which it could be liberated only by treatment with hot alkali. Traces of 4-(2,4-dichlorophenoxy)phenol and its ethyl analogue were also recovered from the treated soils. (Author abstract reprinted by permission of the American Chemical Society)

77- 2064. Ambrosi, D. ; Kearney, P. C.; Hacchia, J. A. (U. S. Dep. Agric., Agric. Environ. Qual. Inst., Agric. Res. Serv., Beltsville, MD 20705). **Persistence and metabolism of oxadiazon in soils.** *J. Agric. Food Chem.* 25(4): 868-872; 1977. (9 references)

Oxadiazon [2-*tert*-butyl -4- (2,4-dichloro -5- isopropylphenyl)-Δ -1,3,4-oxadiazolin -5- one] was incorporated in both moist and flooded Matapeake loam and Monmouth fine sandy loam at 10 ppm plus 10 μCi [*phenyl*-^{14}C]oxadiazon. Soils were sampled after 0, 2, 4, 8, 10, and 25 weeks to determine the distribution of ^{14}C in CO_2, volatile products, soil-bound residues, and metabolites. Oxadiazon degraded slowly in all soils; after 25 weeks, 0.1-3.5% of the [^{14}C]oxadiazon was lost as CO_2, 0.5-1.1% as volatile products, and 1.9-13.3% was bound. Distribution of ^{14}C in the bound residue fraction of the moist soils was fulvic acid > humic acid or humin, whereas ^{14}C was fairly evenly distributed in the flooded bound residue fraction. Oxadiazon, a phenolic and a carboxylic acid derivative were identified in the soil extracts by TLC, GLC, and mass spectral analysis. A dealkylated derivative of oxadiazon was detected by TLC. (Author abstract reprinted by permission of the American Chemical Society)

77- 2065. Iwata, Y. ; Westlake, W. E.; Barkley, J. H.; Carman, G. E.; Gunther, F. A. (Univ. California, Dep. Entomol., Riverside, CA 92521). **Aldicarb residues in organges, citrus by-products, orange leaves, and soil after an aldicarb soil-application in an orange grove.** *J. Agric. Food Chem.* 25(4): 933-937; 1977. (9 references)

A 15% granular formulation of aldicarb (Temik 15G) was soil applied to field plots of Valencia and naval oranges at 2.5, 5.0, 10, and 20 lb of active ingredient per acre. Total carbamate residues (aldicarb, its sulfoxide and sulfone) remaining in the soil and translocated to the leaves and fruit are reported. Residues were found in both rind and pulp. Total carbamate residues in molasses and dried citrus pulp, both used to supplement animal feed, orange juice, and orange oil resulting from processing residue-bearing fruit for by-products are also reported. (Author abstract reprinted by permission by the American Chemical Society)

77- 2066. Harris, C. R. ; Chapman, R. A.; Miles, J. R. W. (Res. Inst., Agric. Canada, London, Ontario, N6A 5B7) **Insecticide residues in soils on fifteen farms in southwesthern Ontario, 1964-1974.** *J. Environ. Sci. Health* B12(3): 163-177; 1977. (6 references)

A long term study (1964-1974) was initiated to determine insecticide residues in the soils from 15 farms in southwestern Ontario. Gas-liquid chromatography was used to determine residues of organochlorines and organophosphates. All farms had DDT residues; these were highest in orchard > vegetable > tobacco > field crop soils. Residue levels of t-DDT were similar to or lower than those first detected in 1964. Thirteen of the 15 farms' soils contained cyclodiene insecticide residues, with the highest concentration in vegetable > tobacco > field crop > orchard soils. A decrease in levels by ca. 1/2 to 3/4 was observed through the duraction of the study. A tenfold increase in organophosphate levels was noted in vegetable soils, particularly those high in organic matter. In 1974 organophosphate levels exceeded the t-cyclodiene residues levels in vegetable soils. Field crop and tobacco soils showed no significant accumulation of organophosphates.

77- 2067. Addison, R. R. ; Brodie, P. F. (Bedford Inst. Oceanogr., Dep. Fish. Environ., Fish. Mar. Serv., Mar. Ecol. Lab., Dartmouth, N. S. B2Y4A2) **Organochlorine residues in maternal blubber, milk, and pup blubber from grey seals** *J. Fish. Res. Bd. Can.* 34(7): 937-941; 1977. (19 references)

Residues of DDT group insecticides and of PCBs were measured in samples of maternal bludder, milk, and pup blubber from grey seals (*Halichoerus grypus*) from Sable Island, N.S. Mean ΣDDT and PCB levels in maternal blubber lipid were 14.0 and 14.5 μg/g, respectively. Concentrations of DDT and PCBs in milk lipid were approximately 60 and 30%, respectively, of those found in maternal bludder lipid, suggesting a partial barrier to passage of these residues through mammary tissue. Concentrations in pup blubber lipid were the same as, or slightly higher than, those in milk lipid. We estimated that a grey seal will lose about 30% of its total EDDT burden and about 15% of its PCB burden through lactation; this would be approximately balanced by its estimated annual intake of these residues from food. Thus, the observation that female seals show no increase in residue burdens with age (in contrast to males) is explained. (Author abstract by permission)

77- 2068. Gjovik, L. R. ; Davidson, H. L. (Forest Prod. Lab., Madison, WI). **Comparison of wood preservatives in**

stake tests: 1975 progress report. *Natl. Tech. Inform. Serv.* AD-A013,544, 72p.; 1975. (no references)

Reports results on test stakes of southern pine sapwood 2 by 4 by 18 inches in size, treated by pressure and nonpressure processes and installed by the Forest Products Laboratory and cooperators in Decay and termite-exposure sites at various times since 1938 at Saucier, Miss.; Madison, Wis.; Bogalusa, La.; Lake Charles, La.; Jacksonville, Fla.; and the Canal Zone, Panama. Superficial treatments by 3-minute dipping and brushing with preservatives such as coal-tar creosite and petroleum oils containing copper naphthenate, zinc naphthenate, phenyl mercury oleate, and pentachlorophenol have added a few months to 4 years to the life of the untreated stakes. Some waterborne preservatives have provided less protection to the stakes than the standard preservative oils, such as coal-tar creosote and pentachloropehenol solutions, when preservative retentions have corresponded to those in commercial use. (Author abstract by permission)

77-2069. Army Engineers Waterways Experiment Station (Vicksburg, MS). **Report on dredged material research program.** *Natl. Tech. Inform. Serv.* AD-A017,215, 17p.; 1975. (no references)

The following topics are discussed: Riverine Utility Craft (RUC) field trials; Field investigation cancelled at Eatons Neck site; Dredged material; Laboratory study of the release of pesticide materials to the water column during dredging and disposal operations; Wildlife habitat development-a case history sequel no. 1; New literature. (Author abstract by permission)

77- 2070. Roan, C. C. (Army Environ. Hyg. Agency, Aberdeen Prov. Ground, MD). **Department of the Army Pesticide Monitoring Program, January - December 1974.** *Natl. Tech. Inform. Serv.* AD-A017,778, 14p.; 1974. (no references)

Evaluations of the data from environmental samples collected during 1974 are generally not directly comparable with the 1973 data. Partial stratification of the 1974 sampling and specific biases deliberately introduced make such comparisons tenuous. The variety of pesticides and their metabolites and, in a few cases, the concentrations detected are generally not compatible with a carefully operated, conservative pest management program. Current concepts of pesticide distribution in the environment are much more conservative than at the time these pesticides were used. (Author abstract by permission)

77- 2071. Bartleson, F. D. ; Harrison, D. D.; Miller, C. L. (Air Force Armament Lab., Eglin AFB, FL). **A survey of trees on a herbicide treated test area, Eglin AFB, Florida.** *Natl. Tech. Inform. Serv.* AD-B002,567, 41p.; 1974. (no references)

A survey was made of trees growing on the 1 square mile instrumented test grid of test area C-52A, Eglin Air Force Base reservation, Florida. This area had previously been subjected to land clearing operations and heavy herbicide deposition. The active herbicide ingredients have disappeared, but there were still many large areas devoid of young trees. The absence of trees in these areas was apparently due to heavy herbicide deposition which prevented regeneration from roots of previous trees and the lack of soil moisture, which has retarded the germination of seeds. The lack of soil moisture was principally attributed to the previous removal of ground cover and consequent drying effects of the wind. The areas with the most trees were generally outside of the herbicide spray aircraft primary flightpaths and were in more moist soil. Young oak trees, sprouting from roots, were predominant on the test area and were in contrast to the surrounding pine forest. Additional studies were recommended to evalute future vegetative succession. (Author abstract by permission)

77- 2072. Luoma, S. M. ((Water Resour. Res. Cent., Hawaii Univ., Honolulu, HI).) **Mercury cycling in a small Hawaiian estuary.** *Natl. Tech. Inform. Serv.* COM-75,11170, 43p.; 1974. (no references)

Uptake from food and water and loss of 203HgC12 were studied in two detritus feeders, the polychaete Nereis succinae and the shrimp Palaemon debilis. During 1973 to 1974, total mercury analyses were also conducted on sediment and biota samples collected. Detritus feeders concentrated dissolved 203Hg from 160 to 310 times over the concentration in sea water. Little 203Hg was accumulated from labelled estuarine sediment; the steady state concentration of 203Hg in the animals was 0.0025 to 0.015 times the concentration in the sediment the animals ingested. Net excretion of 203Hg was slow relative to accumulation in both species. The total mercury content of shrimp and worms collected from the estuary showed a temporal pattern of variation. Samples of shrimp collected description of the accumulation and loss of metal by the shrimp to simulate biotic mercury dynamics in the estuary. The simulation showed that mercury levels in shrimp in the Ala Wai Canal were never at steady state over the 1973-74 sampling period, and indicated the most important source of biologically available mercury in the estuary was some inorganic, solute form of the metal. (Author abstract by permission)

77- 2073. Du Pont de Nemours (E.I.) and Co. (Savannah River Plant, Aiken, SC). **Environmental monitoring in the vicinity of the Savannah River plant. Annual Report, 1974.** *Natl. Tech. Inform. Serv.* DPSPU-75-30-1, 38p.; 1974. (no references)

The results obtained from the environmental monitoring program at the Savannah River Plant during 1974 are presented. An inventory of radioactive materials released to the environment, the data on radioactivity in samples of surface air, surface waters, soil, plants, and food are included. Data are also included on pesticides in Savannah River sediment. (Author abstract by permission)

77- 2074. Truhlar, J. F. ; Reed, L. A. (Geol. Surv., Water Resour. Div., Harrisburg, PA). **Occurrence of pesticide residues in four streams draining different land-use areas in Pennsylvania.** *Natl. Tech. Inform. Serv.* PB-242,770, 29p.; 1975. (no references)

Samples of water, bed material, fish, and soil were collected in four small drainage basins in Pennsylvania in 1969-71 and analyzed to determine the concentrations of chlorinated-hydrocarbon insecticides. Water samples only were also analyzed for phenoxy-acid herbicides. Each basin studied represents a predominant land-use classification--forested, general farming, residential, and orchard farming. All water and fish samples showed pesticide concentrations less than the U.S. Public Health Service's (1969) recommended maximum permissible concentration. However, no fish were found in the orchard area stream at the time collection was attempted. DDT or one of its metabolites was the most frequently occurring insecticide and was detected in all media sampled except the forested-area soil. The highest observed combined concentration of DDT and its metabolites in storm-runoff samples was 11.4 micrograms per liter in a sample collected from the residential area stream, but the median was higher (0.12 microgram per liter) in the orchard area than in the residential area (0.01 microgram per liter). (Author abstract by permission)

77- 2075. Davidson, J. M. ; Brusewitz, G. H.; Wood, A. L.; Baker, D. R. (Oklahoma State Univ., Stillwater, OK) **Use of soil parameters for describing pesticide movement through soil** *Natl. Tech. Inform. Serv.* PB-242,859, 164p.; 1974. (no references)

Solutions of a differential equation for solute transport are described for both transient and steady state soil water conditions. The solutions used independently measured soil and soil-pesticide adsorption-desorption characteristics to describe the movement and distribution of pesticides in a soil profile with time. (Author abstract by permission)

77- 2076. van der Leeden, F. ; Cerillo, L. A.; Miller, D. W. (Geraghty and Miller, Inc., Port Washington, NY) **Ground water pollution problems in the Northwestern United States** *Natl. Tech. Inform. Serv.* PB-242,860, 378p.; 1975. (no references)

An evaluation of ground-water problems has been carried out in six states in the northwest: Colorado, Idaho, Montana, Oregon, Washington and Wyoming. There is a need for baseline water quality data and systematic evaluation of overall ground-water conditions, especially in urban zones, in areas of petroleum exploration and development, and at locations of mining and industrial activity. The most common natural ground-water quality problems, other than high salinity, are excessive hardness, iron, manganese, and fluoride. Principal sources of man-caused ground-water quality problems in the approximate order of severity are: discharge of effluent from septic tanks and sewage treatment plants, irrigation return flow, dryland farming, abandoned oil wells, shallow disposal wells, unlined surface impoundments, mine tailings and mine drainage, municipal and industrial landfills, and radioactive waste disposal. Other sources that appear to be of less importance but still must be considered include: spills and leaks, application of fertilizers and pesticides, feedlots, and salt-water intrusion. (Author abstract by permission)

77- 2077. Whitehouse, J. D. (Kentucky Water Resour. Inst., Lexington, KY) **A study of the removal of pesticides from water** *Natl. Tech. Inform. Serv.* PB-242,971, 187p.; 1976. (no references)

The purpose was to investigate some of the properties of pesticides as they exist in water, and to determine the effectiveness of several water treatment processes in the removal of pesticides from water. Among the pesticides investigated were malathion, DDT, and aldrin; water treatment processes include aeration, chemical coagulation, adsorption on activated carbons and clays, and foam separation. The removal of pesticides from water by aeration was significant. Dieldrin was removed almost 100%, while aldrin, DDT, and BHC were removed to a lesser extent. There was no loss of 2,4,5-T and captan through aeration. Chemical coagulation alone was ineffective in the removal of pesticides from water. Of the processes investigated absorption with activated carbon was the most effective in removing pesticides from water. The removals obtained were--malathion near 100%; 2,4-D, 90%; DDT, 95%; aldrin, 100%; dieldrin, 90%. (Author abstract by permission)

77- 2078. McCully, W. G. ; Stubbendieck, J. L.; Bowmer, W. J. (Texas Transport. Inst., College Station, Texas) **Roadside vegetation studies, 1969-1973** *Natl. Tech. Inform. Serv.* PB-243,042, 28p.; 1974. (no references)

The report presents technology developed in cooperative research to facilitate the establishment of vegetation for soil stability and to control unwanted vegetation in pavement and on the roadside. Work on erosion control dealt with critical slopes where excessive acidity and plastic soil materials limited vegetation establishment. Lime can be used to reclaim exising acid slopes, but subsequent maintenance limiting will be required. Removal of the offending material and backfilling is suggested as a construction practice. Plastic soil materials can be treated in many cases, but present construction requirements make the salvage and immediate use of topsoil possible. The use of chemicals for maintenance of unwanted vegetation is summarized. (Author abstract by permission)

77- 2079. Blanchar, R. W. ; Hess, R. E. (Missouri Water Resour. Res. Center, Columbia, MO) **Prediction of water soluble arsenic in sewage-soil systems** *Natl. Tech. Inform. Serv.* PB-243,127, 309p.; 1975. (no references)

There are several sources of arsenic (As) in soil, including minerals, pesticides, feed additives, and industrial contamination. It has become necessary to evaluate the effect

that a changed soil environment would have on the solubility and possible toxicity of As. The purpose of this study was to determine the stable forms of As in the soil system, based on the stabilities of ferric, aluminum, manganese, calcium, and lead arsenates and to use this information to predict which form will be the most stable under different Eh and pH conditions. Fifteen gram samples of a Sharpsburg silty clay loam and a Menfro silt loam soil containing 320 and 160 micrograms As/g, respectively, were equilibrated for 21 days with 30 ml of distilled water or 1 percent dextrose. After 21 days the samples were freeze dried, divided into 2 groups, one air dry and the other at 26.7 percent water and exposed to the atmosphere. Eh, pH, As, Fe, Al, Mn, Ca, Pb in solution were determined periodically. Both soils were equilibrated with dilute HCl and NaOH for 7 days at 25 degrees C. An experiment was also designed to observed and measure biological reduction of arsenic in the soil system to volatile arsenicals. Platinum electrodes were buried at depths of 7.5, 15, 30, and 60 cm in a Mexico soil that had been treated with 100 ppm As. Variable amounts of sugar, sewage sludge, nitrogen, and water were added. Eh and pH were measured weekly throughout the growing season, and periodically during the rest of the year. The amount of arsenic in Reed's canary grass was measured. (Author abstract by permission)

77- 2080. Haile, C. L. ; Veith, G. D.; Boyle, W. C.; Lee, G. F. (Water Chem. Program, Wisconsin Univ., Madison, WI) **Chlorinated hydrocarbons in the Lake Ontario ecosystems (IFYGL)** *Natl. Tech. Inform. Serv.* PB-243,364, 35p.; 1975. (no references)

Lake Ontario fish, water, sediment, net plankton, Cladophora, and benthos were examined for DDT group pesticides, dieldrin, and PCBs. Endrin, BHC group pesticides, and heptachlor were also identified in some fish samples. Average concentrations ranged from 28 ng/l (t-DDT), 4.8 ng/l dieldrin), and 55 ng/l (PCBs as Aroclor 1254 equivalent) for water to 1.40 micrograms/g (t-DDT), 0.07 microgram/g (dieldrin), and 5.15 micrograms/g (PCBs) for whole fish. DDE levels were generally similar to t-DDT values. PCB/t-DDT ratios averaged 2.6 for all samples except for sediment (7.0) and benthos (5.3) (Author abstract by permission)

77- 2081. Craft, T. F. ; Kimbrough, R. D.; Brown, C. T. (Georgia Inst. Tech., Atlanta, GA) **Radiation treatment of high strength chlorinated hydrocarbon wastes** *Natl. Tech. Inform. Serv.* PB-244,388, 42p.; 1975. (no references)

The possible use of gamma radiation for the treatment of waste effluents containing chlorinated hydrocarbons, particularly pesticides, has been investigated. Significant destruction was obtained of representative compounds such as pentachlorophenol, 2,4,5-trichlorophenoxyacetic acid, and 2,4-dichlorophenoxyacetic acid. Radiation treatment had little effect on polychlorinated biphenyls or mixtures of compounds, including actual manufacturing effluents. It was found that the addition of a material of high atomic weight, such as barium, increased the efficiency of radiation utilization. No other materials were found which increased the desired destruction. G-values were calculated for pentachlorophenol, 2,4,5-trichlorophenoxyacetic acid, and 2,4-dichlorophenoxyacetic acid. It is concluded from the magnitude of these values that radiation treatment of chlorinated hydrocarbons is not economically feasible at the present level of radiation costs. (Author abstract by permission)

77- 2082. Ifeadi, C. N. (Battelle Columbus Labs., OH) **Screening study to develop background information and determine the significance of air contaminant emissions from pesticide plants** *Natl. Tech. Inform. Serv.* PB-244,734, 85p.; 1975. (no references)

In this study, available background information is developed and the significance of air contaminant emissions from the manufacture of six pesticides determined. Pesticides studied are (1) insecticides: methyl parathion and toxaphene; (2) herbicides: monosodium acid methanearsonate (MSMA) and trifluralin; (3) fungicides and wood preservatives: pentachlorophenol; and (4) fumigant: paradichlorobenzene. Background information is gathered from published data and responses to the questionnaires sent to the pesticide manufacturing firms. Based on the available data, production projections are made up to the year 1980. A list of manufacturers of each pesticide is presented. Manufacturing processes, raw and waste material handling, air contaminant emission sources, quantity or quality, and pollutants, together with their present practical control methods are discussed. Significance of air contaminant emissions from the pesticide industry is evaluated on the basis of available data on the emission quantities and/or toxicity of the pollutants emitted. Gaps in the data required to make a complete evaluation of significance are identified and recommendations to fill those gaps are made. (Author abstract by permission)

77- 2083. Environ. Protect. Ag. (Washington, DC) **EPA enforcement, December 1972 to November 1974. Air, water, pesticides** *Natl. Tech. Inform. Serv.* PB-244,948, 405p.; 1975. (no references)

This report offers documentation of the environmental protection agency's enforcement effort over the two year period, December 1972 to November 1974, in the major program areas of air, water, pesticide pollution. It is intended to be the successor volume to the first two years; a February 1973 EPA publication on air, water, pesticide enforcement efforts over the initial period of the agency's existence. (Author abstract by permission)

77- 2084. National Environ. Res. Center (Las Vegas, NV) **Nonpoint-source pollution in surface waters: Associated problems and investigative techniques** *Natl. Tech. Inform. Serv.* PB-243,995, 47p.; 1975. (no references)

The report briefly discusses the following: Nature and origin of nonpoint-source pollution; sources of nonpoint pollutants; prediction of nonpoint-source pollution; and nonpoint-source monitoring. (Author abstract by permission)

77- 2085. Schacht, R. A. (Illinois State Environ. Prot. Agency, Springfield, IL) **Pesticides in the Illinois waters of Lake Michigan** *Natl. Tech. Inform. Serv.* PB-245,150, 52p.; 1974. (no references)

The study was initiated to determine present levels of pesticides in Lake Michigan fish, sediments, and water. Data was collected on six species of Lake Michigan fish (yellow perch, chubs, carp, coho salmon, alewife, and brown trout); open lake and tributary stream and ravine sediments; and open water, tributary stream, and sewage treatment plant effluents. Samples analyzed for pesticides were selected from the following list: Heptachlor, heptachlor epoxide, dieldrin, methoxychlor, lindane, aldrin, endrin, DDT and its analogs. Additional analyses were accomplished for polychlorinated biphenyls (PCB's), di-*n*-butyl phthalate (DBP), and di(2-ethylhexyl) phthalate (DDP). The data indicate that PCB's were found at levels as high or higher than DDT in Lake Michigan water, sediment, and fish. (Author abstract by permission)

77- 2086. Dugan, P. R. (Ohio State Univ., Dep. Microbiol., Columbus, OH) **Bioflocculation and the accumulation of chemicals by floc-forming organisms** *Natl. Tech. Inform. Serv.* PB-245,793, 152p.; 1975. (no references)

Several floc-forming bacteria were isolated from polluted water by this and other laboratories. All organisms studied produced extracellular polymer fibrils that were related to slime matrix and flocculation. The extracellular polymers have high adsorption capacity for: soluble metal and other mineral ions, soluble organic nutrients (BOD), soluble toxic organics, insoluble mineral particles and insoluble organic particulates. The bacteria remove BOD by physical adsorption as well as by oxidative metabolism and can convert oxygen demanding organics to more extracellular polymer. Production of polymer can be stimulated nutritionally to yield amounts that have waste treatment-pollution abatement potential on a commercial scale. The relationship of bioflocculation to waste treatment and lake eutrophication is discussed and the basic mechanism of bioflocculation is considered. Biochemical activities of individual floc-forming cells is examined because of its relevance to polymer synthesis. Taxonomy of floc-formers is also considered in relationship to biochemical activities. (Author abstract by permission)

77- 2087. Chappelow, C. C., Jr. (Midwest Rest. Inst., Kansas City, MO) **Agriculture and clean water. Proceedings of a conference held at Kansas City, Missouri on 3 April 1975** *Natl. Tech. Inform. Serv.* PB-246,113, 160p.; 1975. (no references)

A one day conference was held to promote a constructive dialogue on the development of plans for the control of agriculture related nonpoint source pollution arising from sediment erosion, fertilizer runoff, livestock wastes and pesticides residues. The morning session was devoted to an analysis of the state of the art on nonpoint source pollution related to agriculture with presentations on: (1) Regional aspects and viewpoint; (2) agricultural pollution control; (3) technical basis of control; (4) conservation districts; (5) soil conservation; and (6) plant nutrients. The luncheon session was concerned with an economic overview, consisting of an address on economic problems and opportunities of pollution control. The afternoon session was designed to explore elements of control strategy planning for nonpoint pollution from agricultural sources with papers on: (1) The states' role; (2) one state's approach; and (3) the role of the farmer and agribusiness. (Author abstract by permission)

77- 2088. von Rumker, R. ; Kelso, G. L.; Horay, F.; Lawrence, K. A. (Midwest Res. Inst., Kansas City, MO) **A study of the efficiency of the use of pesticides in agriculture** *Natl. Tech. Inform. Serv.* PB-246,646, 384p.; 1975. (no references)

A study was made of the efficiency of the use of pesticides to identify and quantify the wastes and losses which occur in the treatment of agricultural crops. The study was reported in two volumes. The first volume identified the management practices and decisions for three crops--corn, sorghum, and apples--that may lead to wasteful pesticide use, and quantified the pesticide wastes occurring on each crop as a result of these management practices. The second volume identified the physical factors that cause pesticide waste and losses both during and after crop treatment for agriculture in general, and estimated the application and postapplication pesticide losses and wastes that occurred in 1971 for each of the three above crops. The physical factors which were examined extensively in this study were pesticide overapplication and nonuniform distribution, pesticide drift, and pesticide losses from crops due to runoff and soil erosion. (Author abstract by permission)

77- 2089. Van Horn, W. (URS Res. Co., San Mateo, CA) **Materials balance and technology assessment of mercury and its compounds on national and regional bases** *Natl. Tech. Inform. Serv.* PB-247,000, 433p.; 1975. (no references)

The role of mercury and its compounds in the environment and the economy of the United States was studied. A detailed material balance for mercury and its compounds was developed on a national basis and for selected geographical regions, including estimates of the environmental fate of all emissions. Current and projected process technologies for mercury products were examined, and estimates of environmental losses for 1973 and 1983 were presented. A set of regulatory alternatives was developed for each of the major technologies involving substantial losses of mercury to the environment, and the economic impact of these alternatives was examined. (Author abstract by permission)

77- 2090. Anonymous, **Apparent decreasing trend in contamination of mothers' milk.** *Nippon Iji Shimpo (Jpn. Med. J)* (2776): 102; 1977. (no references) (Japanese)

In 1975 an epidemiological survey on pesticide contamination of mothers' milk was performed by the Ministry

of Welfare in Japan. BHC and DDT were detected in all samples, and 85% contained dieldrin. This survey involved urban districts, agricultural villages, fishing villages, and areas surrounding PCB factories; 258 specimens were collected from nursing women. The average BHC, DDT, and dieldrin contents of mother's milk were 0.08, 0.065, and 0.0025 ppm resepctively. Total BHC and dieldrin content declined annually, but DDT levels were higher than the 1971 figures. Primiparas had higher pesticides residues than multiparas. No relationship was found between the mother's health and the residue levels of DDT, BHC, and PCB.

77- 2091. Haque, A. ; Weisgerber, I.; Kotzias, D.; Klein, W. (Inst. Oekol. Chem., Gesellsch. Strahlen- Umweltforsch. mbH, D-8042 Neuherberg, Germany) **Conversion of [^{14}C]buturon in soil and leaching water under outdoor conditions** *Pestic. Biochem. Physiol.* 7(4): 321-331; 1977. (16 references)

Radiolabeled buturon in aqueous formulation was sprayed onto soil and winter wheat under outdoor conditions at 2.98 kg/ha. Three months after application 46.9% of the applied radiocarbon was recovered from the soil, 0.3% in the leaching water at a depth of more than 50 cm, and 2.0% in the plants. Radioactive residues in soil decreased with increasing soil depth down to 50 cm. The formation of artefacts during extraction of pesticides from soil was avoided by using cold chloroform for extraction; an average of 47% of the soil radioactivity could be extracted in this way. Eight conversion products were isolated and identified by gas chromatography/mass spectrometry. Three conversion products (two of them different from those isolated from soil) were identified in the leaching water, which contained only 0.005-0.006 mg/liter of radioactive substances.

77- 2092. Gunther, F. A. ; Gunther, J. D. (Cornell Univ., Ithaca, NY) **Residues of pesticides and other contaminants in the total environment.** *Residue Rev.* 67: 1-132; 1977. (110 references)

The reentry problem pertains to illness (no confirmed fatalities to date) among agricultural workers entering a treated area following pesticide application. The problem is limited to cholinesterase-inhibiting pesticides at present. Residue levels of these pesticides on soil, fruit, and foliage are affected by formulation, method of application, humidity, rain, temperature, dust levels, and other factors. Methods of lowering residue amounts are being investigated. Washing trees with water may be a useful procedure. Studies on the physical and chemical aspects of reentry in citrus groves have been fairly thorough, but research is continuing on the role of soil types (especially clay contents) in modifying organophosphate residues. Physiologically active residues are transferred to agricultural workers primarily via dislodgable foliar residues and soil surface "dust" residues. Both parent compound (P S) and oxon (P O) residues are readily reduced in the presence of water. In commercial citriculture long-lived dislodgable organophosphate residues are exceptional. The role of clays in increasing longevity of available residues is so great that some groves may be considered potentially reentry hazardous based on soil type alone. A protocol is suggested for acquiring the necessary chemical, biological, and physical data for reentry evaluation.

77- 2093. Japan Association of Chemicals for Forestry Incorporated (Tokyo, Japan) **[Survey on the fate of herbicides for forestry. Part 5. Results on herbicide residues in soil by the method of seed germination.]** *Ringyo to Yakuzai (Forest. Chem.)* 60: 11-14; 1977. (no references) (Japanese)

After applying 3 kinds of herbicides (50% sodium chlorate granules, of non-flammable formulation; 4% TFP granules and 15% DPA granules) to field soil on March 24, samples of the soil were taken from 4 layers (0-5, 5-10, 10-15, and 15-20 cm depth) and sown with three kinds of crops. *Echinochloa utilis, Raphanus sativus* var. acanthiformis, and wheat were planted on April 13 and the germination and growth status of plants were observed. Except for the plot at the higher dose of chlorate, the start of germination was delayed. Damage to plants was severe, except for the radish at smaller dosage of chlorate, and anomalies were observed in plots treated with TFP and DPA. The residues in soil seemed not to be destroyed or inactivated. Results of the sixth experiment showed that the germination time of every plot did not differ, however, damage was larger in higher dose plots than in lower dose plots of chlorate and DPA. In plots of TFP, the damage differed with the soil layer. The residues seemed to remain relatively larger. The results of the seventh experiment showed relatively reduced residues from the viewpoints of germination and damage to plants; however, damage in soils of lower layers was still larger than that of upper layers.

77- 2094. Yamagishi, T. (Div. Sci. Living, Tokyo Metropolitan Inst. Publ. Health, Tokyo, Japan) **[Recent status of environmental contamination by agricultural chemicals (pesticides for agricultural use).]** *Rinsho Eiyo (J. Clin. Nutrition)* 51(1): 33-38; 1977. (no references) (Japanese)

The current status of food contamination by agricultural pesticide residues was studied using meat, milk and dairy products, fish and shellfish and vegetables. The pesticide content of dairy products was largely attributed to the importation of contaminated animal feed. In general, pesticide residues in foods are steadily declining since the ban of BHC, DDT, etc. However, in comparison, the contamination of mother's milk has not declined.

77- 2095. Siddarame Gowda, T. K. ; Sethunathan, N. (Cent. Rice Res. Inst., Lab. Soil Microbiol., Cuttack-6, Orissa, India) **Endrin decomposition in soils as influenced by aerobic and anaerobic conditions** *Soil Sci* 124(1): 5-9; 1977. (9 references)

A radiotracer method was used to investigate the relative persistence of endrin in soils in relation to flooding and alternate "anaerobic" (flooded unstirred) and "aerobic"

(flooded stirred) conditions. Endrin was degraded more rapidly in all three soils (alluvial, laterite, and acid sulfate saline) under flooded than under nonflooded conditions. Formation of six breakdown products was demonstrated after 25 days of incubation in flooded soils, and four degradation products were detected in nonflooded soils. The breakdown products formed in flooded unstirred soil decreased to low levels following incubation under unstirred conditions for another 30 days. When flooded soils were stirred for 30 days after 25 days under unstirred conditions undecomposed endrin and some breakdown products persisted.

77- 2096. Bowman, B. T. ; Sans, W. W. (Res. Inst., Agric. Canada, London, Ontario, Canada, N6A 5B7) **Adsorption of parathion, fenitrothion, methyl parathion, aminoparathion and paraoxon by Na(+), Cs(II), and Fe(III) montmorillonite suspensions** *Soil Sci. Soc. Am. J.* 41(3): 514-519; 1977. (16 references)

This study was conducted to investigate the influence of the saturating cation on the adsorption of parathion, methyl parathion, fenitrothion, aminoparathion, and paraoxon by montmorillonite suspensions. In all cases the saturating cation distinctly influenced the Freundlich-type adsorption, with adsorption decreasing in the following sequence: Fe-(III)-> Ca(II)-> Na(I)-montmorillonite. Adsorption of parathion, methyl parathion, fenitrothion and aminoparathion at low concentrations varied inversely with their water solubilities in Na(I)- and Ca(II)-montmorillonite suspensions, i.e. parathion> fenitrothion> methyl parathion> aminoparathion> fenitrothion> methyl parathion> aminoparathion adsorption. Paraoxon adsorption was slightly greater than the compound with the next lower solubility, aminoparathion. The water solubility of parathion at 20 C was 12.9 μg/ml. Aminoparathion was more than 99.9% adsorbed from solution by Fe(III)-montmorillonite, suggesting the possibility of protonation of the -NH_2 group by the acidic clay surfaces. In Na(I)- and Ca(II)-montmorillonite suspensions, there was some conversion of paraoxon to *p*-nitrophenol. Parathion adsorption-desorption exhibited greater hysteresis effects in Fe(II)-montmorillonite than in Ca(II)-montmorillonite. The desorption pathway was dependent only on the initial concentration. The volume of solution removed in each cycle did not alter the desorption pathway, but only the rate at which the desorption proceeded down the desorption isotherm.

77- 2097. Gerstl, Z. ; Mingelgrin, U.; Yaron, B. (Agric., Res. Org., Volcani Center, Bet Dagan, Israel) **Behavior of vapam and methylisothiocyanate in soils** *Soil Sci. Soc. Am. J.* 41(3): 545-548; 1977. (14 references)

An investigation was undertaken to study the behavior of the fungicide Vapam (sodium-*N*-methyldithiocarbamate) and its toxic degradation product MIT (methylisothiocyanate) in soils to obtain the necessary parameters for predicting the distribution of these compounds when applied in irrigation water. These parameters include adsorption by the soil components, the degradation of Vapam to MIT and the subsequent breakdown of MIT to nontoxic substances, and the distribution of MIT between the liquid, gaseous, and adorbed phases in the soil. Adsorption was determined in both batch and flow methods. The results indicated that degradation of both Vapam and MIT followed first-order kinetics. The breakdown of Vapam to MIT was rapid, half-life generally < 30 min at moisture contents below saturation, while MIT was found to persist for 2 weeks or more. The rapid breakdown of Vapam will result in a soil solution containing mainly MIT. MIT adsorption was relatively low (Kads 0.41 and 0.57 ml/g for the soils higher in clay and organic matter content). The soils with the lower adsorption coefficients (Kads < 0.05) will give a practically uniform MIT distribution with depth when Vapam is applied at a constant concentration in the irrigation water. The behavior of Vapam in heavy textured soils needs further investigation. (Author abstract by permission)

77- 2098. Frank, R. ; Braun, H. E.; Holdrinet, M.; Stonefield, K. I. (Provincial Pestic. Residue Testing Lab., Ontario Min. Agric. Food, Guelph, Ontario, Canada) **Metal contents and insecticide residues in tobacco soils and cured tobacco leaves collected in southern Ontario** *Tob. Int.* 179(3): 79-85; 1977. (31 references)

Metals and insecticides were determined in tobacco soils and flue-cured tobacco leaves collected annually between 1970 and 1975. Mean cadmium contents in cured tobacco leaves were ten times higher than those in dried soils. Other metal contents of the leaves were similar to or lower than those in soils. The total DDT residues declined more rapidly in cured leaf than in soil following the restriction on the use of DDT in 1970 and cancellation of TDE in 1970 and DDT in 1972 Little change was seen in HEOD (dieldrin) and endrin residues in soil and cured leaf between 1970 and 1975; HEOD use was cancelled in 1969 and endrin in 1970. Mean endosulfan residues in cured tobacco in 1972-1975 were 2-5 ppm, of which 40-65% were endosulfan sulfate. Cured leaf was apparently free from chlordane, heptachlor, heptachlor epoxide, and organophosphate residues; only traces of any of these compounds were found in soil. Polychlorinated biphenyl residues averaged 0.008 ppm in a few tobacco leaves tested for it in 1975.

77- 2099. Brockman, F. E. ; Duke, W. B. (Cornell Univ., Dep. Agron., Ithaca NY 14853) **Degradation and leaching of methazole in soil** *Weed Sci* 25(4): 304-308; 1977. (20 references)

The degradation and leaching of methazole [2-(3,4-dichlorophenyl)-4- methyl-1,2,4- oxadiazolidine-3,5- dione] and metabolites in Elmwood sandy loam soil over time in response to average spring environmental conditions was studied by using soil columns placed on a rainfall simulator in an environmental growth chamber. Methazole was degraded to 3-(3,4-dichlorophenyl)- 1-methylurea (DCPMU) and 3-(3,4-dichlorophenyl) urea (DCPU) over a 6-week period

following methazole application, during which the soil columns received simulated rainfall of 1.27 cm every fourth day. Methazole level decreased to 27% of the original amount while DCPMU and DCPU levels increased to 53% and 1%, respectively. Of the total radioactivity remaining in the soil columns after 44 days and after 14 cm rainfall, approximately 80% remained above a depth of 6.35 mm. (Author abstract by permission)

77- 2100. Anonymous **Highway construction and pesticide spraying - two threats to the health of livestock in the Americas** *WHO Chronicle* 31(6): 251-252; 1977. (no references)

Delegates to the Tenth Inter-American Meeting on Foot-and-Mouth Disease and Zoonoses Control were told that disease will be more likely to spread after the imminent completion of the last link in the Pan American Highway. Fears were expressed that construction on the highway will upset the ecological balance of the Darien Gap region and endanger the local Indian cultures. A second threat, the indiscriminate use of pesticides by the Central American cotton industry, was also discussed. This use is a threat to that region's important cattle industry and to agricultural workers. The source of the problem is pesticides such as DDT, dieldrin, and toxaphene, which are frequently applied to the cotton fields from the air. The wind may carry the chemicals to neighboring pastures and the cattle grazing there. Or the cattle may wander off the pasture and forage directly in the cotton field. Feedstuffs used for fattening the cattle, such as cottonseed oil and corn, may also be contaminated and thus pose an additional threat. In addition high levels of pesticides in meat could affect human health. Integrated pest control was suggested as an alternate means of pest control. This approach involves the use of resistant crop varieties, parasites or predators, and sterile insects.

See also **77-2104** **77-2111** **77-2113** **77-2119** **77-2132** **77-2133**

77- 2101. Carlson, L. A. ; Kolmodin-Hedman, B. (King Gustaf V Res. Inst., Dep. Int. Med. Occup. Med., Karolinska Hosp., Stockholm, Sweden.) **Decrease in alpha-lipoprotein cholesterol in men after cessation of exposure to chlorinated hydrocarbon pesticides** *Acta Med. Scand.* 201(4): 375-376; 1977. (8 references)

A significant decrease in α-lipoprotein (HDL) cholesterol was seen after pesticide exposure ceased in eight men who had been exposed occupationally to organochlorine insecticides between 1970 and 1976. No significant alterations were seen in cholesterol concentration of the other lipoprotein classes. This decline following cessation of pesticide exposure supports the hypothesis that exposure to organochlorine pesticides, especially lindane, may raise α-lipoprotein levels.

77- 2102. Zaninovic, M. (Dep. Intern. Med., Ctr., Sibenik, Yugoslavia) **Agranulocitoza kao posljedica upotrebe insekticida. [Agranulocytosis caused by exposure to insecticides.]** *Arh. Hig. Rada. Toksikol.* 28(1): 43-47; 1977. (7 references) (Serbo-Croatian)

A 62-year-old man with chronic bronchitis and cardiovascular disease was hospitalized for agranulocytosis and leukopenia. After retirement he found work as a pesticide applicator, using a variety of organophosphate and carbamate pesticides including malathion, carbaryl, dimethoate, calcium-ammonium nitrate, and metaldehyde. He wore no protective equipment. After 3-4 months of this work he began to feel listless and lost his appetite; his family doctor recommended a complete medical examination. He was subfebrile and subicteric. He recovered within 19 days with supportive therapy and penicillin.

77- 2103. Zaninovic, M. (Dep. Intern. Med., Med. Ctr., Sibenik, Yugoslavia) **Otravanja etiolom. [Intoxications with etiol.]** *Arh. Hig. Rada Toksikol.* 28(1): 49-53; 1977. (4 references) (Serbo-Croatian)

Although malathion is generally regarded as a low-toxicity organophosphate compound, cases of poisoning have been reported. Acute poisoning in two men and two women following ingestion of 1-2 spoonfuls (15-30 g) of Etiol, containing 57% malathion, are reported. One of the patients was conscious and exhibited mydriasis, while the other three were comatose and had classical miosis. Prompt improvement was obtained with atropine in two cases, although one of the patients subsequently died of pneumonia and pulmonary edema. It was not possible to administer the antidote in the fourth case because the moribund patient was taken home by his relatives. Greater restrictions should be applied in the handling and sale of malathion to prevent accidental ingestion.

77- 2104. Demeter, J. ; Heyndricks, A.; Timperman, J.; Lefevere, M.; De Beer, J. (State Univ. Ghent, Dep. Toxicol., B-9000 Ghent, Belgium) **Toxicological analysis in a case of endosulfan suicide** *Bull. Environ. Contam. Toxicol.* 18(1): 110-114; 1977. (4 references)

A 28-year-old man collapsed following ingestion of a large quantity of Thiodan (endosulfan) powder while intoxicated. He was dead upon arrival at the hospital. Autopsy findings suggested asphyxial death due to poisoning, and therefore endosulfan was analyzed in various body tissues and fluids. Stomach contents contained α-endosulfan at 2610 ppm and β-endosulfan at 1900 ppm, blood had 0.06 and 0.015 ppm respectively, urine contained 1.78 and 0.87 ppm, and liver 12.4 and 5.2 ppm respectively. The blood alcohol level was 1.81 g/l. Death was attributed to the combined effects of alcohol and endosulfan.

77- 2105. Gehlbach, S. H. ; Wall, J. B. (Duke-Watts Family Med. Program, Durham, NC) **Childhood poisoning: a community hospital experience** *South. Med. J.* 70(6): 674-676; 1977. (9 references)

Medical records of 53 children who had ingested poison were reviewed. Each of the children was treated as an inpatient. A similar review was made of 107 cases in which the children were treated as outpatients. A much higher incidence of petroleum distillate poisoning than occurs nationally was found in the Southeastern community hospital, and a low frequency of aspirin ingestions. Data on packaging indicated that one third of the poisons was stored in food containers. Of the products encountered, 33% currently require safety packaging but were found in obsolete containers. Pesticide poisoning accounted for 1 of the inpatient cases and 6 of the outpatient cases. Warfarin rodenticides were among the pesticides responsible for the illnesses.

77- 2106. Cyran, J. (Med. Klin. I, Univ. Muenchen, Klin. Grosshadern, Munich, Germany) **Symptomatologie und differentialdiagnostische Probleme bei akuten exogenen Vergiftungen [Symptomatology and differential diagnostic problems in acute exogenous intoxications.]** *Internist* 17(8): 376-385; 1975. (56 references) (German)

Poisoning cases account for between 5 and 10% of hospitalizations in Germany; the estimated number of poisoning fatalities per year is 15,000. Up to 80% of all poisoning cases are caused by drug ingestion, with another 2-3.5% each by ethyl alcohol, carbon monoxide, pesticides, solvents, and acids or alkalies. Rapid diagnoses may be aided by simple methods, including cholinesterase indicator paper for detecting organophosphorus poisons. Major symptoms in various types of acute exogenous poisoning are tabulated. Poisoning by organophosphorus insecticides may become manifest within minutes after oral ingestion, or hours later in the case of percutaneous absorption. Organophosphate poisoning leads to endogenous acetylcholine intoxication, with predominance of muscarinic, nicotinic, or central nervous system symptoms. Paraquat poisoning produces a highly characteristic pattern of symptoms. Thallium (rodenticide) poisoning is rarely accidental. Its onset is insidious. Hair loss is a striking symptom. Poison identification is important not only for specific treatment but also to anticipate the occurrence of complications.

77- 2107. Spear, R. C. ; Popendorf, W. J.; Leffingwell, J. T.; Milby, T. H.; Davies, J. E.; Spencer, W. J. (Sch. Public Health, Univ. California, Berkeley, CA) **Fieldworkers' response to weathered residues of parathion** *J. Occup. Med.* 19(6): 406-410; 1977. (21 references)

Investigations were carried out in July 1974 with the object of determining the route of exposure of orange harvesters to parathion residues, identifying the important toxic constituents of the foliar residue and determining the residue levels at which biochemical responses would occur. A wettable powder formulation of ethyl parathion was applied to three 3-acre plots of Valencia oranges. Entry into the plots treated with 2, 4, and 8 lbs active ingredient per acre was scheduled for 14, 21, and 25 days after application, resp. Exposures began on Monday and ended not later than Wednesday or whenever it appeared that further exposure would lead to red-cell cholinesterase depressions of more than 30% below preexposure baseline levels. No clinical symptoms of organophosphate intoxication were noted in any participant, but red-cell cholinesterase depressions were noted in all cases. Of considerable importance was the degree to which the pesticide residues on the foliage or in the soil dust correlated with worker hazard as reflected by cholinesterase depression. All residue measures except foliar parathion levels were highly correlated with cholinesterase response rate. The use of parathion levels in the soil dust can be dismissed as a reliable indicator of hazard when a substantial oxon residue is present. Paraoxon residues in the soil dust or on the foliage are the most logical hazard indices. However, the dermal dose data indicate that in these plots the soil dust played a relatively unimportant role in the immediate exposure process. The foliar residue seems the more appropriate environmental correlate of worker hazard.

77- 2108. Spear, R. C. ; Popendorf, W. J.; Spencer, W. F.; Milby, T. H.. (Sch. Public Health, Univ. California, Berkeley, CA) **Worker poisonings due to paraoxon residues** *J. Occup. Med.* 19(6): 411-414; 1977. (9 references)

Three poisoning incidents which occurred among agricultural field workers in Tulare County, California in June 1975 are reviewed. All three incidents occurred on the property of a single grower. A review of the facts in these cases allows a relationship between paraoxon residues and cholinesterase depression to be seen. In each case the poisoning eposide can be attributed to exposure to paraoxon in the work environment. The paraoxon content of both the foliar and soil dust and the corresponding oxon-thion ratios were extraordinarily high in each of the groves in which an incident occurred. Neither the formulated material nor the residues resulting from a subsequent experimental application of the same lot of pesticide contained abnormal amounts of paraoxon. Therefore a transient and unusual set of environmental conditions existed that affected the parathion residues and resulted in the abnormal production and persistence of paraoxon. It is suggested that photochemical oxidants may have been involved.

77- 2109. Phoon, W. O. (Univ. Singapore, Dep. Soc. Med., Outram Hill, Singapore 3, Malaysia) **Occupational health in the tropics** *J. Occup. Med.* 19(7): 458-463; 1977. (17 references)

Although the basic concepts of occupational health in temperate countries are applicable in the tropics as well the practices and problems of this field may be very different. Examples of factors causing such differences include heat stress, biological hazards, differences in heredity and in educational levels, and preponderance of small industries in the tropics. The hot, humid climate may make it difficult to persuade workers to wear protective equipment. High temperatures may increase the speed of skin absorption of chemicals. The humid atmosphere may affect the reliability of monitoring instruments. Elevated temperatures have been shown to increase susceptibility to most drugs. However, workers in the tropics may bathe more frequently than their counterparts in colder climates if facilities are available. The training of occupational health practicioners in the tropics should be appropriately modified and should preferably be conducted on location.

77- 2110. Fournier, P. E. ; Efthymiou, M. L.; Dally, S. (Hosp. Fernard Widal, 75475 Paris Cedex 10, France) **Human monitoring program in occupational contamination by chemicals in rural medicine** *J. Occup. Med.* 19(7): 464-468; 1977. (19 references)

Epidemiologic methods are needed for toxicologic surveys in relation to occupational health, yet studies of this type are expensive. Pesticide contamination offers a good example of the differences between acute, subacute, and chronic exposure. The problems of acute intoxication are fairly well publicized, although problems may arise in the case of minor or atypical manifestations. Subacute contamination may be monitored by staffs of occupational boards, using biochemical parameters. Interest in this aspect of monitoring was generated by the detection of cases of polyneuritis and aplasia. These studies followed the same pattern employed for monitoring drug side effects according to the WHO. Epidemiologic surveys begin with correlations of a symptom in the general population with blood pesticide levels.

77- 2111. Brungs, W. A. ; McCormick, J. H.; Neiheisel, T. W.; Spehar, R. L.; Stephan, C. E.; Stokes, G. N. (Environmental Res. Lab., Duluth, MN) **Effects of pollution on freshwater fish** *J. Water Pollut. Control Fed.* 49(6): 1425-1493; 1977. (454 references)

This is a literature review which covers the broad area of the effects of pollution on freshwater fish. Specific areas covered in the literature survey include: reviews and symposia; water quality; pesticidal pollutants such as insecticides and other pesticides; industrial pollutants, including inorganics, and pulp and paper; domestic pollutants; and radioactive pollutants. Specifically mentioned under insecticide pollutants are DDE, DDT, dieldrin, chlorinated hydrocarbon pesticides, organophosphate and carbamate insecticides, chlordane, toxaphene, heptachlor, heptachlor epoxide,

aldrin, mirex, piperonyl butoxide, methoxychlor, trifluralin, lindane, pyrethroids, methyl parathion, carbaryl, parathion, pentachlorophenol, arecoline, 2,4-D, enterobacterin, fenitrothion, dichlorvos, imidan, and malathion. Specific herbicides mentioned include diquat dibromide, potassium endothall, diquat, dinoseb, picloram, azoplant, benomyl, thiophanate-methyl, BCM, dalapon, fenuron, and folmar. Specific pesticides mentioned include rotenone, antimycin, and trifluoromethyl-4-nitrophenol (TFM).

77- 2112. Herricks, E. E. ; Buikema, A. S. (Univ. Illinois, Urbana, IL) **Effects of pollution on freshwater invertebrates.** *J. Water Pollut. Control Fed.* 49(6): 1493-1506; 1977. (125 references)

This literature review discussed the toxic effects of pollution on freshwater invertebrates. Specific areas under which reports are listed include: reviews and books, community effects, microcosm studies, cladocera (biocides, heavy metals, and miscellaneous compounds), other zooplankton (copepods, ostracods, amphipods, freshwater shrimp, and rotifers), insects, clams and snails, worms, protozoa, and other studies.

77- 2113. Spear, R. C. (Aerosp. Med. Res. Lab., Wright-Patterson AFB, OH) **Organophosphate pesticides: The residue intoxication problem** *Natl. Tech. Inform. Serv.* AD-A011, 851, 12p.; 1974. (no references)

The report presents the results of an investigation into the technical questions surrounding the residue intoxication phenomenon of organophosphate pesticides. It includes the development of relevant sampling techniques and experimental procedures needed to evaluate harvester exposure. Seven field studies have been conducted to study the absorbed doses or physiological responses of exposure of the human body to organophosphate pesticides. (Author abstract by permission)

77- 2114. Wolthius, O. L. (Med. Biol. Lab., RVO-TNO, Rijswijk, The Netherlands) **An alternative therapy against organophosphate poisoning..** *Natl. Tech. Inform. Serv.* N75-24337, 23p.; 1974. (no references)

Respiratory inhibition caused by organophosphate poisoning is only partially antagonized by oxime therapy because of the difficulty of oximes in passing the blood-brain barrier. Medicaments aimed at bridging the period of respiratory failure by converting residual muscular twitches to contractures of sufficient duration for adequate respiratory movements were investigated. A number of semi-synthetic compounds such as 9-anthroic acid are experimented with. Such a therapy would have the advantage of being independent of the peripheral or central nature of the respiratory block. (Author abstract by permission)

77- 2115. Davies, J. E. (Dep. Epidemiol. Public Health, Miami Univ., Miami, FL) **Occupational and environmental pesticide exposure study in South Florida.** *Natl. Tech. Inform. Serv.* PB-243,826, 92p.; 1975. (no references)

Multiresidue analysis of urinary pesticide metabolites offers an effective means of measurement of human exposure to the non-persistent pesticides. In studies of different degrees of human exposure to parathion DEP, a metabolite of paraoxon, was the most sensitive indicator of serious exposure. Concentrations of $>$ 0.4 microgram/ml were observed in first urines collected in seven cases of poisoning with serious enzyme inhibition. In contrast, from 71 sequential urines in parathion exposed workers only one urine exceeded these concentrations. The DEP:DETP ratio was equally informative, the mean ratio being 4.14 in 20 urines from the poison cases and 0.88 in urines of exposed workers. Excretion of metabolites for 91 days after ingestion of dichlorfenthion was observed, emphasizing the significance of exposures to the less polar organophosphates in both acute and chronic effects. A variety of pesticides were identified in a regular air monitoring program for pesticides in South Florida. (Author abstract by permission)

77- 2116. Federal Working Group on Pest Management. (Rockville, MD) **Occupational exposure to pesticides.** *Natl. Tech. Inform. Serv.* PB-244,259, 164 p.; 1974. (no references)

The report presents two parts information on reentry of farm workers into fields with plant surfaces treated with pesticides. Part A assembles and interprets all available information regarding extent and severity of the problem of chemical pesticide residues on treated plant surfaces which may constitute a hazard to the health of workers who must in the course of their work come into substantial contact with these surfaces. It also identifies significant areas in which relevant information is not available. Part B identifies and discusses a number of problems of major interest to investigators who undertake to develop sound scientific criteria upon which to base reentry interval recommendations. Design of reentry investigation is discussed and guidelines for reentry research are provided. Salient points include selection of a satisfactory experimental plot, selection of a suitable experimental group, arrangements for reliable cholinesterase monitoring, and attention to a number of other minor, but potentially confounding variables. (Author abstract by permission)

77- 2117. Lawless, E. W. (Midwest Res. Inst., Kansas City, MO) **Guidelines for the disposal of small quantities of unused pesticides** *Natl. Tech. Inform. Serv.* PB-244,557, 342p.; 1975. (no references)

This study has compiled and organized information that will be useful to responsible authorities in advising the layman (particularly the homeowner and small farmer) how to dispose properly of small amounts of surplus spills. The report brings together available information on pesticide disposal methods and on over 550 individual pesticides, and evaluates this information in terms of the experience and equipment that the average layman has. Fourteen pesticide disposal procedures are described and procedures for disposal

of containers and cleanup and treatment of spills are included. Preferred and alternate disposal procedures are recommend for over 550 pesticides. The report includes a cross-index of over 1,600 pesticide names, tables showing the chemical composition and properties pertinent to disposal of the selected pesticides and bibliography of 166 references. (Author abstract by permission)

77-2118. Soil Conserv. Serv. (Washington, DC) **Agricultural waste management field manual.** *Natl. Tech. Inform. Serv.* PB-244,466, 352p.; 1975. (no references)

The manual is intended primarily for use by SCS field personnel in planning and installing agricultural waste management systems. Major emphasis is on management of wastes from concentrated livestock operations although recycling or disposal of solid and liquid community wastes on agricultural land is also discussed. Characteristics of various wastes are covered as well as their effects on soils, plants, water, fish, and wildlife. There is a chapter on planning complete livestock and poultry waste management systems and another chapter on design of system components including waste storage facilities, lagoons, settling facilities, holding ponds, waste irrigation systems and other conservation practices. Other chapters provide guidance in management of pesticides and other chemicals and in monitoring and sampling of water quality. Much of the data and information in this manual will also be useful to other indivuduals and organizations working in the field of agricultural pollution abatement. (Author abstract by permission)

77- 2119. Criteria Eval. Div. (Environ. Protect. Ag., Washington, DC) **DDT: A review of scientific and economic aspects of the decision to ban its use as a pesticide.** *Natl. Tech. Inform. Serv.* PB-245,029, 307p.; 1975. (no references)

The report reviews the 1972 decision cancelling many of the registrations of DDT. It takes into consideration all of the costs and benefits and the importance of protecting the Nation's supply of food and fiber. It centers on the key findings of the Administrator in his decision of June 14, 1972, and is divided into four major areas: Fish and wildlife effect; human effect; residues in the environment and man; economic aspects. (Author abstract by permission)

77- 2120. Counc. Environ. Qual. (Washington, DC) **Toxic substances** *Natl. Tech. Inform. Serv.* PB-245,378, 36p.; 1971. (no references)

The report speaks of toxic substances, specifically metals and their compounds and synthetic organic compounds. It briefly describes each substance and traces its path through the environment. Each substance's interaction with and effect on the environment is discussed. It deals extensively with technological and legal controls and suggests a new system for dealing with the problem. (Author abstract by permission)

77- 2121. Dep. Health, Educ., and Welfare (Washington, DC) **Hazards of mercury.** *Natl. Tech. Inform. Serv.* PB-245,772, 104p.; 1970. (no references)

The study group spent one week in Sweden and three days in Finland meeting with scientists, engineers, and public officials who have been actively working on the mercury problem in those countries. The report summarizes the findings and sets forth recommendations relating to major steps which should be taken in the U.S. to define and correct the mercury problem. Medical implications of ingestion of mercury, microbial transformation of mercury, sources, distribution, and control, ecological effects of methyl-mercury contamination, farming-food-forestry, airborne mercury, and the chemical analyses of mercury are all discussed at length. Portions of this document are not fully legible. (Author abstract by permission)

77- 2122. Sutton, W. W. ; Salomon, L. L. (Dugway Prov. Ground, UT.) **Development of a biological monitoring network - a test case - suitability of livestock and wildlife as biological monitors for organophosphorus contaminants.** *Natl. Tech. Inform. Serv.* PB-246,062, 50p.; 1975. (no references)

A review was conducted of a DPG monitoring network which is designed to establish baseline erythrocyte acetylcholinesterase (AChE) levels in the fauna of West Central Utah, and to evaluate the suitability of using livestock and wildlife as biological monitors for organophosphorus contaminants. Wildlife species sampled during these DPG efforts included the antelope ground squirrel, the ORD Kangaroo rat, the deer mouse, and the black-tailed jackrabbit. Individual blood samples from these wildlife species as well as samples from cattle and sheep were collected and analyzed for red cell AChE activity. The analytical method employed was based on the Warburg manometric technique. Results indicate that the range of red cell AChE activity values for both livestock and wildlife species is sufficiently compact to allow observation of the depression of enzymic activity that would result from organophosphorus exposures. (Author abstract by permission)

77- 2123. Wastler, T. A. ; Offutt, C. K.; Fitzsimmons, C. K.; Des Rosiers, P. E. (Oil Spec. Mater. Control Div. Environ. Prot. Agency, Washington, DC) **Disposal of organochlorine wastes by incineration at sea** *Natl. Tech. Inform. Serv.* PB-246,243, 223p.; 1975. (no references)

The first officially sanctioned incident of ocean incineration in the United States occurred aboard the M/T Vulcanus in the Gulf of Mexico from October 1974 through January 1975 under an ocean dumping permit issued by the U.S. Environmental Protection Agency for ocean incineration of organochlorine wastes. The report describes the monitoring activities undertaken to evaluate ocean incineration as a disposal method. A total of 16,800 metric tons of waste were incinerated at a maximum rate of 25 metric tons per hour with a 1200C minimum and a 1350C average flame temperature. Stack gas emissions were monitored for plume disper-

sion characteristics and to determine combustion efficiency. The findings indicate that more than 99.9 percent of the wastes were oxidized. Marine monitoring surveys indicate that there were no measurable increases in concentrations of trace metals and organochlorides in the water and marine life. Results of the project indicate that ocean incineration could be a viable alternative of waste disposal which should be considered along with other disposal methods including direct ocean disposal, land disposal, and land incineration. (Author abstract by permission)

77- 2124. Wastler, T. A. ; Offutt, C. K.; Fitzsimmons, C. K.; Des Rosiers, P. E. (Environ. Activities Group, Marit. Adm., Washington, DC.) **Maritime administration chemical waste incineration ship project (Volume 2 - Appendix IV, U.S. Environmental Protection Agency Report: Disposal of organochlorine wastes by incineration at sea).** *Natl. Tech. Inform. Serv.* PB-246,728, 221p.; 1975. (no references)

The first officially sanctioned incident of ocean incineration in the United States occurred aboard the M/T Vulcanus in the Gulf of Mexico from October 1974 through January 1975. This report describes the monitoring activities undertaken to evaluate ocean incineration as a disposal method. A total of 16,800 metric tons of waste were incinerated at a maximum rate of 25 metric tons per hour with a 1200C minimum and a 1350C average flame temperature. Stack gas emissions were monitored for plume dispersion characteristics and to determine combustion efficiency. The findings indicate that more than 99.9 percent of the wastes were oxidized. Marine monitoring surveys indicate that there were no measurable increases in concentrations of trace metals and organochlorides in the water and marine life. See also volume 1, PB-246,727. (Author abstract by permission)

77- 2125. Brown, L. R. ; Alley, E. G.; Cook, D. W. (Mississippi State Univ., Mississippi State, MS) **The effect of mirex and carbofuran on estuarine microorganisms.** *Natl. Tech. Inform. Serv.* PB-247,147, 57p.; 1975. (no references)

The purpose of the investigation was to help establish the chemical, physical and microbiological fate of mirex and carbofuran in the estuarine environment and determine the effect(s) on important estuarine microorganisms and their activities. Chemical studies on the adsorption, fate and hydrolysis were conducted. The microbiological studies involved the use of both pure cultures and mixed cultures in a microcosm system and included twelve distinct physiological groups of microorganisms. It was concluded that neither mirex nor carbofuran would have a deleterious effect on estuarine bacteria under normal conditions, and there was no evidence of bioaccumulation. Degradation products of both compounds were shown to be toxic to some microorganisms. (Author abstract by permission)

77- 2126. Fujita, Y. (School of Hygiene, Faculty of Med., Okayama Univ., Okayama, Japan) **[Health superintendence of vinyl greenhouse workers part 2. Change of operation and its evaluation.]** *Okayama Igaku Zasshi (J. Okayama Med. Assoc.)* 89(1,2): 161-173; 1977. (7 references) (Japanese)

Findings obtained during 4 years of health monitoring on workers in vinyl greenhouse horticulture in Nakamura and Sukumo cities in Kochi Prefecture were described. The major item was the results of health examinations on 87 (1972), 183 (1973), 181 (1974) and 164 (1975) workers of both sexes, concerning the farmer's syndrome, which consists of shoulder discomfort, waist pain, vertigo, abdominal distension, nocturnal pollakisuria, insomnia, dyspnea and reduction of serum cholinesterase activity. The frequency of reporting farmer's syndrome and the number of abnormal serum cholinesterase activity determinations have declined year after year. The area of cultivation has become larger, the frequency of claiming the syndrome has become smaller, and the reduction of cholinesterase activity has become lower. In the group with reduced times of pesticide application, in the group with sustained pesticide application, and in the group with reduced hours of pesticide application, the improved group reporting of th syndrome and the improved group cholinesterase activity increased. The kinds of pesticides applied did not change in these four years.

77- 2127. Smith, D. M. (Employment Med. Advisory Serv., Government Bldgs, Worcester, England) **Organophosphorus poisoning from emergency use of a handsprayer** *Practitioner* 218(1308): 877-883; 1977. (6 references)

Because of a sudden infestation of Midlands wheat with aphids, pesticide spraying was required on a large number of small farms. Available application methods were inadequate, and many farmers purchased directly from the manufacturer a compact ultra-low-volume (ULV) hand sprayer designed for use in developing countries. In the ensuing weeks a total of 15 patients with pesticide intoxication were observed; ten of them had sprayed organophosphorus insecticides (mostly demeton S-methyl) using the hand sprayer, two had used tractors with booms, and two had sprayed from helicopters. The fifteenth had sprayed methomyl with the hand sprayer. Most of the poisoned individuals had disregarded safety precautions. Clinical symptoms of sweating, anorexia, nausea, vomiting, diarrhea, and prostration were consistent with cholinesterase inhibitor poisoning. Medical aid was not always sought immediately, but all those who visited doctors took along the warning label from the pesticide. Four of the patients showed very severe clinical and biochemical abnormalities and without treatment would probably have progressed to coma and death.

77- 2128. Knobel, G. J. (Gov. Pathol. Lab., Cape Town, South Africa) **Aircraft fatality investigation: the non-natural death** *S. Afr. Med. J.* 52(4): 150-152; 1977. (14 references)

A total of 128 fatal civil aircraft accidents occurred in the Republic of South Africa between 1966 and 1974. Mechanisms of deaths in such cases other than multiple injuries include immersion in water, fires, and poisoning (pesticide inhalation). To evaluate these factors chemicotoxicological investigations are performed following accidents. Routine

toxicological analysis should be performed on the victims of aircraft disasters if the medical aspects of the investigation are to be considered complete. In this manner aircraft accident pathology can be resolved and accident reconstruction facilitated.

77- 2129. Di Bosco, M. M. ; Pesci, O. (Author address not given) **Dermopatie e sindromi reattive da impiego di antiparassitari in agricoltura. [Dermapathologies and reactive syndromes deriving from the use of insecticides in agriculture.]** *Securitas* 61(3-4): 113-117; 1976. (35 references) (Italian)

Over a six-year period (1964-1969) 2298 cases of illness due to the use of agricultural chemicals were reported to insurance companies. Of these cases, 231 represented skin afflictions, most frequently attributed to dithiocarbamates, sulfur, and organophosphorus compounds. Combined manifestations were seen in some cases, presenting both skin abnormalities and general symptoms. These sometimes resembled known drug reactions. Three case histories are presented as examples, comprising intoxications by captan, triphenyltin acetate, and vapam (metham).

77- 2130. Anonymous **[Basic plan for controlling Japanese pine sawyer (*monochamus alternatus*) decided.]** *Shokubutsu Boeki (Plant Prot. News)* 1098: 9-10; 1977. (Japanese)

In order to terminate the abnormally severe damage of pine forests due to a nematode which is transmitted by *Monochamus alternatus*, a law was passed on April 16, 1977, and a basic plan of action was decided upon by the Ministry of Agriculture and Forestry. In the plan, special measures were established for preventing pesticide effects on agriculture, fishery, etc., and for safeguarding the environment and man from these effects. The special method of insect control is to be applied to forests meeting all the following conditions: (1) the degree of damage exceeds the limiting degree, (2) no risk of damaging the environment due to drift or penetration of pesticide is considered to exist, (3) endangered organisms do not live in the area, and (4) no risk of damage of fishery and agriculture is considered to exist. The special method was defined as pesticide application from airplanes.

77- 2131. Bulger, A. R. ; Correa, R. J. (Dep. Surg., Virginia Mason Med. Cent., Seattle, WA) **Experience with adrenal cortical carcinoma.** *Urology* 10(1): 12-18; 1977. (21 references)

Eight cases of histologically proved cortical carcinoma are reviewed and compared with several series from the literature. Emphasis is given to defining endocrinologic function in these tumors and to the role of nonoperative treatments. Whereas surgical therapy offered significant palliation, response to radiation therapy was unusual; and no benefit from chemotherapy was demonstrated in any of the patients.

77- 2132. Model', A. A. (Kiev. Res. Inst. Occup. Hyg. Indust. Med., Kiev, USSR) **Gipotalamicheskie sindromy professional'noi etiologii [Working capacity and rehabilitation of patients with the hypothalamic syndrome of professional etiology.]** *Vrach. Delo* 3: 122-126; 1977. (no references) (Russian)

Changes in general condition and working capacity were examined in 83 patients with the hypothalamic syndrome caused by various occupational factors. The patients were followed for 2-6 yr. The syndrome was diagnosed as being due to work with pesticides in 64 cases, with antibiotics in 3 cases, and with various physical factors in 16 cases. A favorable course of the pathological process was seen with good possibilities for rehabilitation in cases where the disease was of short duration and treatment was started early. These cases included patients with vegetative-vascular paroxysms, disease caused by the effect of physical factors and having concomitant pathology of the peripheral nerves, and functional disorders of the central nervous system. An unfavorable course of the disease may be the result of associated complications, intercurrent diseases, or prolonged duration of the disease of toxic etiology, and may be seen in patients with hypothalamic syndrome due to encephalitis and encephalopolyneuritis.

77- 2133. Popov, T. A. ; Kaskevich, L. M. (All-Union Res. Inst. Hyg. Toxicol. Pestic. Polymers Plastics, Kiev, USSR) **Vozmozhnosti vyyavleniya doklinicheskikh form toksicheskogo gepatita putem otsenki aktivnosti oksidaz s meshannoi funktsii pecheni [Possibilities of assessment of preclinical forms of toxic hepatitis by evaluation of liver mixed oxidase activity function.]** *Vrach. Delo* 3: 126-130; 1977. (no references) (Russian)

Liver mixed function oxidase (MFO) activity was assessed following aminopyrine loading in 45 individuals who had occupational contact with pesticides. Twelve of the test subjects worked with zineb and 33 with both organochlorine and organophosphate pesticides. The data obtained were compared with values from routine clinical laboratory examinations. The results indicated that evaluation of MFO activity permits detection of preclinical forms of toxic liver damage. These data may therefore be used as an index of the functional status of the liver in clinically pronounced forms of the pathology and as a criterion for efficacy of treatment. The method of MFO evaluation by following aminopyrine demethylation is convenient to use and may be used in any laboratory to evaluate MFO activity.

See also **77-2201** **77-2217** **77-2033** **77-2083** **77-2100**

77- 2134. Bleyer, H. ; Moeritz, K. U.; Grisk, A. (Inst. Pharmakol. Toxikol., Ernst-Moritz-Arndt Univ., 22 Greifswald, DDR) **Beeinflussung der Adenylatzyklaseaktivitaet und des 3',5'-AMP-Gehaltes in Herz und Grosshirn der Ratte durch Diisopropylfluorphosphat. [The influence of diisopropylfluorophosphate upon the adenylate cyclase activity and the 3',5'-AMP content.]** *Acta Biol. Med. Ger.* 35(1): 87-92; 1976. (26 references) (German)

Diisopropylphosphorofluoridate (DFP) and paraoxon at concentrations of 1-100 n*M* are capable of inhibiting adenylate cyclase (ATP-pyrophosphatelyase, cyclizing, EC 4.6.1.1.) from rat stomach and cerebrum. Dimethoate exerts a similar effect at concentrations of 0.1-10 μM. The cAMP content of myocardium diminished by 59.9%, and the cAMP content in the cerebrum declined by 68.2% after DFP was administered i.p. at 1.44 mg/kg. The depletion of cAMP in the rat heart caused by twice the LD50 of DFP cannot be influenced by atropine, alone or in combination with TMB-4 (toxogonin). These findings have implications in relation to the action mechanism of organophosphorus compounds.

77- 2135. Valkama, E. L. ; Lindqvist, O. V. (Dep. Pharmacol. Zool., Univ. Kuopio, Finland) **A radiographic whole-body study on the distribution of (^{14}C)-DDT (dichloro(U-^{14}C) phenyltrichloroethane) in the crayfish (astacus).** *Acta Pharmacol. Toxicol.* 41(S1): 152; 1977. (1 reference)

Crayfish (*Astacus astacus*) were kept for a maximum of 24 hr in 0.1 ppm C-14-labeled DDT until the animals were wholly paralyzed. The crayfish were then frozen at -80 C. The highest concentrations of DDT accumulated in the gills and the outer surface of the cuticle. There were no differences between the sexes in surface accumulation. Higher concentrations were shown by liquid scintillation analysis in the internal organs of the females, which correlates well with their higher lipid content.

77- 2136. Katz, N. (Inst. Endemias Rurais, Fundacao Oswaldo Cruz, Minas Gerais, Brazil). **Chemotherapy of schistosomiasis mansoni.** *Adv. Pharmacol. Chemother.* 14: 1-70; 1977. (560 references)

The chemotherapy of Schistosomiasis mansoni is reviewed. Included in the review is information on the laboratory maintenance of *Schistosoma mansoni*; drug testing in vitro and in vivo; preclinical trials; clinical trials in the hospital, outpatient clinic, and in the field; antischistosomal drugs in clinical use such as antimonials, niridazole, lucanthone and hycanthone, and oxamniquine; and compounds with antischistosomal activity such as nitrofuran derivatives, thiazolines and nitrothiazolines, arylazonaphthylamine derivatives, thiophene derivatives, organophosphorus compounds, tubercidin, SN 10.275, S-201, A-16,612, RD-12,869, tris(*p*-aminophenyl)carbonium salts, *p*-aminophenoxyalkene derivatives, dehydroemetine, and other active compounds. The organophosphorus compounds so used include dichlorvos and trichlorfon (synonyms neguvon, chlorophos, dylox, and metriphonate).

77- 2137. Margard, W. L. ; DeVore, D. P.; Dennis, A. J. (Battelle Columbus Lab., Columbus, OH.) **A comparative in vitro bioassay study of the toxicity of aldrin, parathion, paraoxon, benzo[a]pyrene, $CdCl_2$, and an oil fly-ash extract** *Ann. Clin. Lab. Sci.* 7(4); 372; 1977. (no references)

Experiments were conducted to compare the relative responses of five mammalian cultured cell lines to various environmental toxicants in order to develop a useful cell culture screening system based on metabolic indicators. Comparison standard materials were benzo[a]pyrene, cadmium chloride, aqueous fly ash extract, aldrin, parathion, and paraoxon. Cell lines were BALB/c 3T3, WI-38, HeLa, rat lung, and human foreskin fibroblasts. Two culture programs were used, employing prescreen confluency bioassay and clonal toxicity assay. The toxicity of the substances compared favorably but not identically between the cell lines. The cytological responses of the primary rat lung and human foreskin cell cultures were more variable than those of the established cell lines. Toxicity was also evaluated in relation to effects on cellular macromolecular metabolism (protein synthesis and RNA synthesis). Aldrin was the most inhibitory pesticide for protein synthesis and paraoxon was the most inhibitory for RNA synthesis. The nonpesticide toxicants elicited a much less pronounced effect.

77- 2138. Gokhale, V. S. ; Bapat, V. M.; Kanitkar, S. V.; Kulkarni, S. D. (B. F. Med. Coll., Dep. Pharmacol., Poona, 411 001, India.) **Altered sensitivity to acetylcholine during chronic administration of organophosphorus anticholinesterase (Fenthion) in albino mice** *Arch. Int. Pharmacodyn. Ther.* 226(2): 331-338; 1977. (6 references)

Tissue sensitivity to acetylcholine during chronic administration of fenthion was assessed in mice. Fenthion was injected intramuscularly every fourth day and experiments were carried out at various intervals. The parameters selected for testing cholinergic effects were acetyl choline-induced contraction of isolated ileum and salivary secretion in vivo. In both types of experiments an initial supersensitivity followed by tolerance to acetylcholine were observed. The underlying mechanisms are discussed.

77- 2139. Ferguson, J. A. ; Korte, F. (Inst. Oekol. Chem., Gesellsch. Strahlen- Umweltforsch. mbH, 8051 Aaching, Germany) **Epoxidation of aldrin to exo-dieldrin by soil bacteria** *Appl. Environ. Microbiol.* 34(1): 7-13; 1977. (14 references)

Twenty-two strains of soil bacteria, including representatives of the genera *Bacillus, Micromonospora, Mycobacterium, Nocardia, Streptomyces, Thermoactinomyces,* and *Pseudomonas* and 10 unidentified gram-negative, motile, rod-shaped bacteria, were shown to degrade aldrin to its epoxide dieldrin. In every case, the *exo*-stereoisomer of dieldrin was produced exclusively. (Author abstract by permission)

77- 2140. Dubois-Krack, G. ; Roberfroid, M.; Bettencourt, A.; Mercier, M. (Lab. Biotoxicol., Ecole Pharm., Univ. Louvain, 1200 Brussels, Belgium) **Michaelis-Menten kinetic analysis of aldrin epoxydase on microsomes and isolated rat hepatocytes.** *Arch. Int. Physiol. Biochem.* 85(2): 381-433; 1977. (7 references)

Formation of reactive compounds such as epoxides is generally regarded as an essential step in metabolic activation of carcinogens. Aldrin was selected for a study of epoxide formation, since dieldrin, its epoxide, is quite stable and is not a substrate for epoxide hydratase. Microsomes and isolated adult rat hepatocytes were incubated in buffer systems in the presence of aldrin; the dieldrin formed was extracted with hexane and its concentration determined by gas-liquid chromatography. The pH optimum of aldrin epoxidase was 7.2 for microsomes and 7.4 for hepatocytes; the time coefficients were 3 min and 4 min for microsomes and hepatocytes, and the protein concentration coefficients were 7 μg/ml and 80/6 μg/ml for microsomes and hepatocytes respectively. Because of its lipid solubility aldrin is a good substrate for intact isolated liver cells. The kinetic parameters of enzyme activity were comparable in microsomes and hepatocytes.

77- 2141. McLean, A. E. M. ; Driver, H. E. (Univ. Coll. Hosp. Med. Sch., Dep. Expert. Pathol., University St., London WC1, England) **Combined effects of low doses of DDT and phenobarbital on cytochrome P450 and amidopyrine demethylation** *Biochem. Pharmacol.* 26(14): 1299-1302; 1977. (17 references)

Low doses of DDT (2-5 mg/kg) and phenobarbital (<2 mg/kg/day) cause an increase of the cytochrome P450 and amidopyrine demethylation activity of rat liver. The combined stimuli have an added effect. It is suggested that other inducers probably have similar additional effects and that the known increase in drug metabolism produced by feeding natural diets is due to the summation of many inducer effects caused by different substances each at low dosage. (Author abstract by permission)

77- 2142. Carevic, O. (Res. Dep. PLIVA, Pharm. Chem. Works 41000 Zagreb, I. L. Ribara 89, Yugoslavia) **The effect of gamma-hexachlorcyclohexane on rat liver lysosomes** *Biochem. Pharmacol.* 26(15): 1377-1381; 1977. (45 references)

An intraperitoneal injection of gamma-HCH (lindane, 40 mg/kg, LD_{50}) was shown to induce a significant release of three lysosomal enzymes-acid phosphatase, β-glucosidase and cathepsin D in rat livers already 1 hr after administration of the agent. From 1 hr up to 24 hr of the observation period the release of selected lysosomal hydrolases consistently increase. In contrast to the biochemical findings, the morphological changes, including hepatic necrosis and fatty infiltration, were established only 24 hr after gamma-HCH treatment. The in vitro studies on the latency of two lysosomal enzymes—acid phosphatase and β-glucosidase—in the rat liver lysosome-rich suspension treated with gamma-HCH, showed that the concentrations, of .01 m centrations of gamma-HCH did not significantly change the activities of acid phosphatase, β-glucosidase and cathepsin D in vitro. No significant alterations were observed in the total activities of enzymes studied after in vivo and in vitro administered gamma-HCH. The present study suggests that gamma-HCH exerts its effect on rat liver lysosomes by modifying the structural properties of the lysosomal membrane. (Author abstract by permission)

77- 2143. Berry, D. L. ; Slaga, T. J.; Wilson, N. M.; Zachariah, P. K.; Namkung, M. J.; Bracken, W. M.; Juchau, M. R. (Univ. Washington, Dep. Pharmacol. Anesthesiol., Sch. Med., Seattle, WA 98195) **Transplacental induction of mixed-function oxygenases in extra-hepatic tissues by 2,3,7,-8-tetrachlorodibenzo -*p*- dioxin.** *Biochem. Pharmacol.* 26(15): 1383-1388; 1977. (41 references)

Treatment of pregnant rats with 2,3,7,8-tetrachlorodibenzo -*p*- dioxin (TCDD) resulted in a dose-dependent induction of a mixed-function oxidase system in fetal and maternal extra-hepatic tissues. At doses of 6 μg/kg, aryl hydrocarbon hydroxylase (AHH) activity was increased 24-, 22- and 4-fold in fetal lung, kidney and skin, respectively, while maternal lung, kidney and adrenal AHH activity was increased 4-, 2- and 2-fold respectively. High-pressure liquid chromatographic (H.P.L.C.) analysis of benzo(a)pyrene (BP) metabolism after TCDD induction indicated that fetal lung, kidney and skin produced significant quantities of benzo(a)-pyrene-7,8-dihydrodiol (BP-7,8-diol), benzo(a)pyrene -4,5-dihydrodiol (BP-4,5-diol) and 9- and 3-phenols of BP. The fetal liver produced benzo(a)pyrene -9,10- dihydrodiol (BP-9,10-diol), BP-4,5-diol, BP-7,8-diol and 9- and 3-phenols of BP. Maternal lung also produced BP-9,10-diol, while maternal adrenal gland yielded primarily the 9-phenol of BP. Epoxide hydratase activity was increased 2- to 3-fold in maternal lung, fetal lung and skin after TCDD pretreatment, but was not affected significantly in liver, kidney or placenta. Treatment of pregnant rats with TCDD increased the covalent binding of BP to DNA in preparations containing maternal liver, lung and placenta as well as fetal liver, lung and skin. Pretreatment with TCDD resulted in increased epoxide hydratase and AHH activiites in extra-hepatic tissues but only AHH was increased in hepatic tissues, indicating that the inducing capabilities of TCDD differ from, but share some similarities with, both phenobarbital (PB) and 3-methylcholanthrene (MC). Thus, TCDD appears to provide an exceptionally potent and broad-spectrum transplacental induction of carcinogen-transforming enzymes in extra-hepatic tissues. (Author abstract by permission)

77- 2144. Statham, C. N. ; Szyjka, S. P.; Menahan, L. A.; Lech, J. J. (Med. Coll. Wisconsin, Dep. Pharmacol., Milwaukee, WI 53233) **Fractionation and subcellular localization of marker enzymes in rainbow trout liver.** *Biochem. Pharmacol.* 26(15): 1395-1400; 1977. (28 references)

The subcellular fractionation of rainbow trout liver homogenates prepared in 0.25 M sucrose was investigated using marker enzymes to assess the homogeneity of the resulting fractions. In addition to the usual mitochondrial and microsomal fractions, an additional fraction was sedimented between 8000 g for 10 min and 13,300 g for 10 min. Of the four accepted hydrolytic "marker" enzymes for rat liver lysosomes, the high relative specific activity (R.S.A.) of acid phosphatase was indicative of enrichment in this fraction. The R.S.A. patterns of 5'-nucleotidase and alkaline phosphatase indicated that the plasma membranes of fish liver were sedimenting with "nuclear" and microsomal pellets. This latter fraction contained the highest percentage of the total glucose 6-phosphatase, benzopyrene hydroxylase and glucuronyl transferase assayed in the fish liver homogenate before fractionation. The R.S.A. of these same enzymes in the microsomal pellet indicated an enrichment in this fraction relative to other cellular fractions. (Author abstract by permission)

77- 2145. Nagano, K. ; Kawano, K.; Otsuka, T.; Okabe, M.; Shibaoka, E.; Nishino, H. (No. 3 Lab., Tokushima Factory, Otsuka Pharmaceutical Co., Ltd., Tokushima, Japan) **[Studies on subchronic (6 months) toxicity of "Altosid" in rats.]** *Bochu Kagaku (Sci. Pest Contr.)* 42(II): 63-74; 1977. (8 references) (Japanese)

Studies on subchronic oral toxicity of a juvenile hormone-like synthetic candidate insecticide, Altosid (methoprene) were carried out using SPF Sprague-Dawley rats of both sexes. The dose levels were 0, 80, 400, 2000 and 10,000 ppm in the feed consisting of sterilized and powdered Oriental feed and olive oil containing 5% of Altosid. Rats were fed for 25 weeks at 22 2°C., RH of 50%. During the feeding, a reduction of body weight gain and a reduction of feed consumption were recognized in both sexes in the 10,000 ppm group. Only one female in the 2000 ppm group died, but generally, the specific changes attributable to the administration were slight. On pathohistological examination a degenerative change was seen in the liver parenchyma of animals given more than 2000 ppm of Altosid. The change showed relationships to the level and the results of biochemical examination. According to these findings, the maximal no effect level, the minimum intoxication level, and the definite intoxication level were presumed respectively to be 400 ppm, 2,000 ppm and 10,000 ppm in the feed. The no effect level was calculated to be about 20 mg of Altosid/kg b.w./day.

77- 2146. Mendoza, C. E. ; Shields, J. B. (Bur. Chem. Saf., Health Prot. Br., Health & Welfare Canada, Ottawa, Ontario, Canada K1A OL2) **Effects on esterases and comparison of I50 and LD50 values of malathion in suckling rats** *Bull. Environ. Contam. Toxicol.* 17(1): 9-15; 1977. (12 references)

Malathion was administered by intragastric intubation to 6 and 12-day-old Wistar rat pups. The dosages ranged from 250-2000 mg/kg for the 6-day-old pups and from 500-4000 mg/kg for the 12-day-old pups. Controls were given the corn oil vehicle only. Enzyme analysis was performed on the livers, brains, and kidneys 1 day at treatment. In the 7-day-old pups, 250-500 mg/kg malathion produced approximately a 65% inhibition of liver esterase activity towards IPA and a 13-36% inhibition of liver cholinestease activity. At 1000-2000 mg/kg, inhibition of the liver esterases did not exceed 80%, although these dosages produced a 90% inhibition of ASChI hydrolysis in the brain. The highest dosages produced a very low degree of inhibition of esterase hydrolyzing IPA and only about a 50% maximum inhibition in the kidney. The esterases of the 13-day-old pups were less severely inhibited by malathion, although the patterns of esterase inhibition were similar for the two groups. The I50 and LD50 values for malathion were similar in pups of different ages and were similar for pups of different ages pretreated with HCB. The data further indicate that I50 values of malathion based on brain acetylcholinesterase inhibition can be used as reliable estimates of LD50.

77- 2147. Saarikoski, J. ; Kaila, K. (Univ. Helsinki, Dep. Physiol. Zool., 00100 Helsinki, 10 Finland) **Effects of two chlorinated phenols on the spontaneous impulse activity of the abdominal tonic motor system in the crayfish (L)** *Bull. Environ. Contam. Toxicol.* 17(1): 40-48; 1977. (21 references)

The mode of action of PCP and TCP was examined by observing their effects on the spontaneous impulse activity of the abdominal tonic motor system recorded from the roots of an isolated crayfish ganglion. PCP affects the impulse frequencies of the tonic motor axons at concentrations above 1 ppm and TCP at concentrations above 10 ppm. The frequency changes in the dorsal superficial second root branch (extensor neurons) and ventral superficial third root branch (flexor neurons) both comprised inhibition of the smaller, higher-frequency units, and excitation of the large units. Neither compound apparently excited the fast extensor axons located in the second ganglionic root. The frequency changes were phasic; the latency of response was short. Both compounds diminished the amplitudes and increased the durations of the extracellularly recorded action potentials, sometimes leading to conduction block at higher concentrations.

77- 2148. Maki, A. W. ; Johnson, H. E. (Environ. Water Qual. Res. Dep., Proctor & Gamble Co., Ivorydale Tech. Cent., Cincinnati, OH 45217) **The influence of larval lampricide (TFM:3-trifluoromethyl -4- nitrophenol on growth and production of two species of aquatic macrophytes, Elodea canadensis and Myriophyllas spicatum.** *Bull. Environ. Contam. Toxicol.* 17(1): 57-65; 1977. (9 references)

The toxicity of the larval lampricide TFM (3-trifluoromethyl -4- nitrophenol) for two vascular hydrophytes, *Elodea canadensis* and *Myriophyllus spicatum*, was studied. The plants were obtained from naturally occurring stocks, and exposure to the toxicant was conducted in totally recirculating model streams. After a growth period of up to 2 wk, during which the plants were exposed to 5.0-35.0 mg/l

TFM, the individual shoots were ashed and the dry weights and ash-free dry weights determined. Analytical grade TFM inhibited the growth and production of vegetative shoots of *Elodea canadensis* at all concentrations greater than 5.0 mg/l. A net loss in biomass occurred following exposure to 10.0-35.0 mg/l for over 24 hr or to 20.0-35.0 mg/l for over 3 hr. Primary production was also progressively inhibited as a function of exposure time. *Myriophyllum spicatum* was more susceptible to the toxicant. The greatest percentage reduction in biomass occurred after 1 and 4 hr of exposure to all concentrations greater than 5.0 mg/l. The toxicant appeared to affect both species of plants similarly.

77- 2149. Desaiah, D. ; Koch, R. B. (Univ. Mississippi Med. Cent., Dep. Pharmacol. Toxicol., Jackson, MS 39216) **Influence of solvents on the pesticide inhibition of ATPase activities in fish and insect tissue homogenates.** *Bull. Environ. Contam. Toxicol.* 17(1): 74-81; 1977. (9 references)

A variety of solvents were tested to determine their effects on the inhibition of ATPase activities from catfish (*Ictalurus punctatus*) brain and cockroach (*Periplaneta americana*) muscle and nerve cord by DDT, toxaphene, and plictran. None of the solvents tested had any effect on ATPase activities when tested by themselves. The inhibitory effects of DDT and toxaphene were greatly reduced by cyclohexane solvent as compared to 95% ethanol, but the ATPase inhibition by plictran showed no difference due to solvent. The response due to the injection of an approximate LD50 dose of DDT in the abdomens of cockroaches also differed depending on the solvent used for the DDT. Compared with ethanol, cyclohexane, hexane, benzene, pentane, and cyclopentane reduced the DDT-induced inhibition of ATPase activities, the amount of reduction being variable for the different solvents. In general, however, the Na -K ATPase activity from the catfish brain preparation showed less inhibition by DDT dissolved in the nonpolar solvents compared to the ethanol solvent than did the Mg^{2} ATPase activities. The effects of solvent in the cockroach nerve preparation were quite variable and did not necessarily follow the same pattern as in the other tissue preparations. Thus, the type of solvent used for dissolving the chlorinated hydrocarbon pesticides DDT and toxaphene can have great influence on their inhibitory action on the ATPase system.

77- 2150. Hurlbert, S. H. (San Diego State Univ., Dep. Biol., San Diego, CA 92182) **Toxicity of chlorpyrifos to mallard ducks** *Bull. Environ. Contam. Toxicol.* 17(1): 105-107; 1977. (6 references)

In a recent review article on the toxicity of chlorpyrifos to birds, a full page was devoted to criticizing an experimental study in which it was found that treatment of shallow fenced ponds with this compound resulted in mortality of young mallard ducks. Seven "important factors which [the authors] ignored or omitted from consideration" in the latter study are responded to individually. It is concluded that the original observation of a 42% post-treatment duck mortality on treated ponds and 0% mortality on control ponds, and the attribution of the mortality to Dursban applications remain effectively unchallenged. It is conceivable, however, that under less severe test conditions, fewer or no ducks might have died on the treated ponds.

77- 2151. Nelson, J. O. ; Kearney, P. C. (Univ. Maryland, Dep. Entomol., College Park, MD 20705) **Metabolism of maleic hydrazide (MH) by hepatic microsomes from phenobarbital induced rats** *Bull. Environ. Contam. Toxicol.* 17(1): 108-111; 1977. (5 references)

Hepatic microsomes were prepared from two male Sprague-Dawley rats pretreated with three consecutive daily doses of phenobarbital (75 mg/kg, ip). The microsomes were incubated with an NADPH-generating system and 64 nCi of 3,6-(^{14}C) maleic hydrazide (MH), 126 nCi of 4,5-(^{14}C) MH, 24.1 μg of unlabeled MH, or 20 μg of unlabeled aldrin. The MH was dissolved in methanol. Heat inactived controls minus the cofactors were also studied. The microsomal preparations were enzymatically active, but no $^{14}CO_2$ was detected from either 3,6- or 4,5-^{14}C-labeled MH as determined by radioactivity counting. The recovered radioactivity was consistently lower with 3,6-^{14}C-labeled MH than with the 4,5-^{14}C-labeled MH, the difference being found with both complete and control incubations. There was no detectable hydrazine liberated during the incubations. Maleimide, maleamic acid, maleic acid, fumaric acid, and succinic acid were not detectable in the incubation mixtures using thin-layer chromatography. The results suggest a lack of metabolism of MH by this *in vitro* system, and strongly suggest that mammalian liver microsomal systems are incapable of degrading MH.

77- 2152. Shannon, L. R. (Iowa State Univ., Ames, IA 50011) **Accumulation and elimination of dieldrin in muscle tissue of channel catfish** *Bull. Environ. Contam. Toxicol.* 17(6): 637-644; 1977. (12 references)

Dieldrin accumulation and elimination in muscle tissue of channel catfish (*Ictalurus punctatus*) from water and food was studied. Catfish exposed to 2 ppm dieldrin through their diets accumulated significantly more dieldrin in muscle than did fish exposed to 75 pptr in water. When fish were exposed to dieldrin both in food and water, dieldrin from both sources contributed to the total dieldrin load. Large catfish accumulated more dieldrin from food and water than did smaller catfish. After 28 days of elimination, levels of dieldrin were not significantly different in muscles of 150-225 mm and 350-440 mm catfish exposed via both food and water.

77- 2153. Sjoden, P. O. ; Archer, T.; Soderberg, U. (Neurophysiol. Lab., Uppsala Univ., Uppsala, Sweden) **Effects of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) on radioiodine distribution in rats** *Bull. Environ. Contam. Toxicol.* 17(6): 670-678; 1977. (26 references)

The effects of 2,4,5-T on I-131 distribution was investigated over a longer period of time than had been done in

earlier studies. The results show that a single oral injection of 100 mg/kg 2,4,5-T depresses 24 hr serum I-131 as well as the absolute thyroid counts in male rats, probably due to effects of an increased renal iodine clearance. The effect may be caused partly by a hormonal response to a reduced drinking and partly, or entirely, by an effect on the kidneys resembling the effect of diuretics such as ethacrynic acid, known to potentiate chloruresis. The heavy changes in the pattern of distribution of radioiodine after 2,4,5-T administration suggests the presence of widespread changes in membrane functions. The marked electrolyte disturbances after 2,4,5-T are of special interest to the understanding of the toxic effects of phenoxyacetic acids on the fetus and the newborn. The study also provides a new possibility of dose-response measurements of the effects of 2,4,5-T.

77- 2154. Kolaja, G. J. (Biomed. Lab., Edgewood Arsenal, Aberdeen Proving Ground, MD 21010) **The effects of DDT, DDE and their sulfonated derivatives on eggshell formation in the mallard duck** *Bull. Environ. Contam. Toxicol.* 17(6): 697-701; 1977. (9 references)

This paper reports the results of a study conducted to determine the effects of the sulfonated derivatives of DDT and DDE on eggshell formation in the duck. When peak egg production was reached in the experimental animals, the test compounds were added to the poultry laying mash. Eight experimental groups (1 drake and 5 hens each) received 10 ppm and 50 ppm of DDT, DDE, DDT-SO4 and DDE-SO4, respectively, with 4 groups remaining as controls. The study showed that while DDT and DDE fed to mallard ducks at levels of 10 and 50 ppm caused significant alterations in eggshell measurements such as thickness, weight, and in R-values, their sulfonated dervatives did not share these characteristics. The sulfonated compounds did cause a reduction of thickness at day 18, but this decreased thickness was not as severe as that caused by DDT or DDE and is a transitory effect. R-values showed that DDT and DDE are potent agents in causing a reduction of the weight-to-size ratio of eggshells, but the sulfonated compounds caused no significant change when compared to controls. The sulfonated products of DDT and DDE were less toxic to birds during egg production than DDT or DDE.

77- 2155. Ushio, F. ; Doguchi, M. (Tokyo Metropolitan Res. Lab., Tokyo, Japan) **Dietary intake of some chlorinated hydrocarbons and heavy metals estimated on the experimentally prepared diets** *Bull. Environ. Contam. Toxicol.* 17(6): 707-711; 1977. (10 references)

Estimates were made of the dietary intakes of the residues of PCBs, PCTs, HCB, total mercury, methylmercury, lead, and cadmium in diets for 10 days of an experimental period. The diets for 4 of these 10 days were provided to meet the nutritional requirements for 20-29 year old men in the year 1973, and those for the remaining 6 days were prepared to meet the needs of pregnant women in 1974. Significant amounts of PCBs were detected in all diet samples examined with one exception. The average dietary intake of PCBs was 6.3 μg/day with a range from trace to 17 μg. PCT residues could not be detected in certain of the diets. The average concentration of PCTs in diets in which there were residues were 0.05 μg. Dietary intakes of DDT and BHC ranged from 1.3 to 12.2 μg/day and 3.0 to 6.9 μg/day, resp. The average daily intakes of cadmium and lead were estimated as 49 μg and 190 μg with ranges of 13-70 and 100-286 μg/day, resp. The highest concentration of total mercury was 80 μg per day and this occurred in a diet in which tuna was involved as an ingredient. The highest level of methylmercury, 60.8 μg, was found in a diet containing *Sebastes matsubarai*, a kind of deep sea fish. The average contents of total mercury and methylmercury were 35 μg and 13.9 μg, resp.

77- 2156. Kachole, M. S. ; Pawar, S. S.; Mahajan, A. G. (Biochem. Div., Chem. Dept., Marathwada Univ., Aurangabad, Maharashtra, India) **The toxicity of endrin and the effect of pretreatment of phenobarbital and hexobarbital on mortality in four fresh water fishes** *Bull. Environ. Contam. Toxicol.* 17(6): 768-770; 1977. (3 references)

Four species of freshwater fish (*Nemacheilus botai, Nemacheilus denisoni, Poecilia granulosa,* and *Lepidocephalichthys thermalis*) were studied to determine the toxicity of endrin and the effect of pretreatment with phenobarbital or hexobarbital on the mortality caused by endrin. Phenobarbital sodium and hexobarbital sodium (1 ppm) exerted a protective effect for the fish exposed to 1 ppm endrin. Phenobarbital and hexobarbital in the liver cause induction of hepatic mixed function oxidase system which is vital in the biotransformation of various foreign compounds. It is suggested that phenobarbital and hexobarbital pretreatment developed some capacity in the fishes to tolerate the toxicant on the central nervous system level.

77- 2157. Nelson, J. O. ; Menzer, R. E.; Kearney, P. C.; Plimmer, J. R. (Univ. Maryland, Dep. Entomol., College Park, MD 20742) **2,3,7,8,-Tetrachlorodibenzo-*p*-dioxin: in vitro binding to rat liver microsomes.** *Bull. Environ. Contam. Toxicol.* 18(1): 9-13; 1977. (8 references)

Hepatic microsomes from normal or phenobarbital-pretreated male rats were incubated with ^{14}C-TCDD (dioxin) and an NADPH generating system. The incubated mixtures were extracted, and the organic, aqueous, and precipitate phases were counted. Induced microsomes from pretreated rats bind over 40% of added ^{14}C-TCDD to the soilds fraction. This binding is mediated by a heat-sensitive, NADPH-requiring system. Microsomes prepared from noninduced rats bound 7% of the added TCDD. Addition of SKF-525A, a mixed function oxidase inhibitor, reduced TCDD binding in pretreated cells to control levels. This suggests that the binding of TCDD to the solids of the microsomal incubation mixture is mediated by a mixed function oxidase system. The binding was apparently not covalent, since chloroform/methanol extraction of the incubation mixture removed the bound material. The binding reached a maximum between

45 and 60 min and decreased upon further incubation. The absence of phenolic and dihydrodiol metabolites suggests that this binding is not mediated through an arene oxide intermediate.

77- 2158. Prescott, L. M. ; Kubovec, M. K.; Tryggestad, D. (Augustana Coll., Biol. Dep., Sioux Falls, SD 57102) **The effects of pesticides, polychlorinated biphenyls and metals on the growth and reproduction of *Acanthamoeba*.** *Bull. Environ. Contam. Toxicol.* 18(1): 29-34; 1977. (14 references)

The free-living ameba *Acanthamoeba castellani* was selected for a study of pollutant effects on protozoa. Cultures of *Acanthamoeba* in growth medium were treated with the pesticides, and the organisms were counted after 6 days of incubation. The population growth of the ameba was inhibited by 10-60% by linuron, Stam F-34 (propanil), carbaryl, propham, and atrazine at 10 mg/l. The polychlorinated biphenyl Aroclor 1254 had no significant effect at 0.01 mg/l. The results with atrazine differed from those previously published, which indicated a far greater toxic effect. The growth of *Acanthamoeba* was unaffected by moderately high levels of copper and zinc, but was sensitive to the presence of lead and mercuric ions. Atrazine and simazine at concentrations of 4 mg/l produced 15% and 14% growth inhibition respectively.

77- 2159. Zitko, V. ; Carson, W. G.; Metcalfe, C. D. (Environ. Canada Biol. Stn., St. Andrews, New Brunswick, Canada EOG 2XO) **Toxicity of pyretheoids to juvenile Atlantic salmon.** *Bull. Environ. Contam. Toxicol.* 18(1): 35-41; 1977. (9 references)

The lethality of permethrin to juvenile Atlantic salmon (*Salmo salar*) was determined and compared to that of pyrethrins and allethrin. Static tests were conducted in Erlenmeyer flasks using salmon with an average length of 10 cm and a water temperature of 10 C. The concentration of pyrethrins, allethrin, and permethrin in water decreased exponentially during the toxicity tests. Permethrin was considerably more persistent than the other compounds. The lethal threshold for pyrethrins was 0.0320 mg/l, of allethrin 0.0165 mg/l, and of permethrin 0.0088 mg/l. The hydrolysis products of permethrin were not lethal at the highest concentration tested, 5 mg/l. Permethrin was detectable in exposed fish, but the accumulation coefficient was low (about 55). The lethality data are similar to those obtained in other samlonids, permitting a structure-activity correlation which indicated that lethality increased with increasing octanol/water partition coefficient.

77- 2160. McNulty, W. P. (Oregon Reg. Primate Res. Cent., 505 N.W. 185th Ave., Beaverton, OR 97005) **Toxicity of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin for Rhesus monkeys: brief report.** *Bull. Environ. Contam. Toxicol.* 18(1): 108-109; 1977. (6 references)

Individually caged one-year-old male rhesus monkeys were fed cubed diet containing TCDD (dioxin) at 2 or 20 μg/kg. Complete autopsies were performed immediately after spontaneous death. The monkey fed the 20 ppb diet became lethargic after the third day and died on the twelfth day, with a 30% weight loss. Activity of the monkey given the 2 ppb diet decreased after ten days. At 58 days the eyelids were swollen and the face was edematous. Following a stomach biopsy procedure at 61 days the monkey seemed to recover, but died 15 days later. The total weight loss was 33%. Paraffin sections of the stomach biopsy showed complete mucous metaplasia of the fundic mucosa with high mitotic activity and extension of glands into the submucosa. The lesions were similar to those seen in monkeys poisoned with PCB.

77- 2162. Richter, E. ; Lay, J. P.; Klein, W.; Korte, F. (Inst. Pharmacology, Toxicology Pharmacy, Dep. Vet. Med., Univ. Munich, D-8000 Munich 22, Germany) **Enhanced elimination of hexachlorobenzene in rats by light liquid paraffin.** *Chemosphere* 6(6): 357-369; 1977. (28 references)

HCB and other organochlorine compounds are lipophilic and metabolically stable. An equilibrium between fat and lymph has been postulated for these compounds. Liquid paraffin is often used, usually in combination with sodium sulfate, for treating acute poisoning with lipophilic organic compounds. In the preliminary experiment Wistar rats were given a single i.p. dose of HCB in peanut oil at 50 mg/kg body weight. After three days the experimental animals were gavaged on 5 days/week with light liquid paraffin at 10 ml/kg/day. In the main experiment rats were fed a commercial diet containing 1.5 ppm ^{14}C-HCB for seven days, then a ration containing 8% light liquid paraffin. No significant differences in body weight gain and liver/body weight ratio were seen in the preliminary experiments. After 5 doses of paraffin a significant reduction of HCB residues in blood and fat were seen; a plateau of 70.8% of control values was reached after 15 doses. The 8% paraffin in the diet did not significantly influence body weight gain and feed consumption or the relative organ weights. On the first day of paraffin treatment there was a threefold rise in the concentration of HCB in the feces followed by a rapid decline.

77- 2163. Engst, R. ; Macholz, R. M.; Kujawa, M. (Cent. Inst. Nutr. Acad. Sci. GDR, GDR-1505 Potsdam-Rehbruecke, DDR) **The metabolization of lindane in a culture of mould and the degradation scheme of lindane** *Chemosphere* 6(7): 401-418; 1977. (22 references)

The degradation of lindane, γ-pentachlorocyclohexane, and isomeric tetrachlorobenzenes was examined in cultures of mold grown spontaneously on grated carrots. Lindane metabolites were identified as 1,2- and 1,4-dichlorobenzene, 1,2,3-, 1,2,4-, and 1,3,5-trichlorobenzene, 1,2,3,4-, 1,2,4,5- and/or 1,2,3,5-tetrachlorobenzene, pentachlorobenzene, γ-trichlorophenol, 2,3,4,5-, 2,3,4,6-, and/or 2,3,5,6-tetrachlorophenol, and pentachlorophenol. A degradation scheme is proposed to account for the formation of these metabolites. Conjugates of lindane were not observed in the mold culture.

77- 2164. Kohli, K. K. ; Maggon, K. K.; Venkitasubramanian, T. A. (Dep. Biochem., Vallabhbhai Patel Chest Inst., Delhi, Delhi-110007, India) **Induction of mixed function oxidases on oral administration of dieldrin** *Chem.-Biol. Interact.* 17(3): 249-255; 1977. (37 references)

Rat liver weights (male Wistar rats) were increased by administration of dieldrin at 30 mg/kg body weight. Microsomes obtained from livers of dieldrin-treated animals displayed significantly enhanced metabolism of aflatoxins B_1 and G_1 as compared to controls. It was thus concluded that dieldrin increased mixed function hydroxylase activity. Dieldrin increased the liver microsomal NADPH oxidase activity and decreased lipid peroxidation. Increased phosphatidylcholine contents were also seen in the livers of dieldrin treated animals.

77- 2165. Abston, P. A. (Mississippi State Univ., State College, MS) **A study of in vivo physiological and biochemical alterations in the livers of laboratory rats (Sprague-Dawley) following mirex exposure.** *Diss. Abstr. Int. B* 37(12 Part 1): 5988; 1977. (no references)

Adult male and female rats fed mirex concentrations of 10-200 ppm ad libitum for a period of 1-4 weeks showed significant decreases in hepatic levels of lactic dehydrogenase, malic dehydrogenase, sorbitol dehydrogenase, glutamic oxaloacetic transaminase, and glutamic pyruvic transaminase relative to control. Decreases in these enzymes were from the soluble fraction of the hepatocyte. Decreases in the hepatic levels of lactic dehydrogenase and glutamic oxaloacetic transaminase in mirex-fed rats were apparently due to induction of new enzyme protein. Changes in liver enzyme levels were not related to changes in serum cortisol levels. Mirex exposure resulted in significant increases in liver weights, total liver protein, and total liver lipid but did not alter the liver water content (percent of wet weight), liver lipid concentration, or liver protein concentration. Significant alterations of the size and relative concentrations of free-pool amino acids in the liver and serum were observed following one week of 50 ppm mirex feeding. At the end of three weeks the size of the liver amino acid pool returned to normal in both male and female rats, although the ratios of the concentrations of the amino acids in the pool were significantly different from the control. Changes in liver and serum amino acids indirectly indicated a potential alteration in hepatic gluconeogenesis following mirex feeding. Mirex feeding resulted in a significant decrease in the average time of survival during a subsequent period of starvation for both male and female rat. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 77-11,746.)

77- 2166. Jackson, D. (Carleton Univ., Ottawa, Ontario, Canada) **DDT: effects on some membrane-related functions** *Diss. Abstr. Int. B* 37(12 Part 1): 5926; 1977. (no references)

The adenosine triphosphate hydrolase (ATPase) activity of membrane fractions isolated from brain tissue was investigated as a possible site of toxic action of DDT in salmonid fish. When added to the in vitro assay medium, DDT and several other ogranochlorines inhibited both the Na + K- and Mg-activated ATPase, but their in vitro effects did not correspond well with their generally observed in vivo toxicities. Kinetic studies of the Mg-ATPase indicated that a single step, of activation energy 15.4 kcal/mole, was rate-limiting from 5 to 40 C. The basis of organochlorine inhibition appeared to be a dose-dependent reduction in the ability of the Mg-ATPase to lower the activation energy of ATP hydrolysis. This effect, combined with an apparent increase in the frequency factor of the reaction, gave rise to biphasic dose-response curves, with low doses of organochlorine stimulating Mg-ATPase activity and larger doses of organochlorine was an inverse function of temperature. Substrate competition studies showed that DDT was an allosteric inhibitor of the Mg-ATPase. However, it is suggested that this inhibition is unlikely to give rise to the observed symptoms of acute in vivo DDT intoxication. (Author abstract by permission, abridged)

77- 2167. Childers, G. W. (Mississippi State Univ., State College, MS) **Effect of mirex and related compounds on estuarine bacteria.** *Diss. Abstr. Int. B* 37(12 Part 1): 5977; 1977. (no references)

A total of 20 bacterial isolates representing 10 genera was tested for inhibition of growth by four samples of mirex using the disc assay method. Test results varied from sample to sample, and gas chromatographic analyses confirmed that different batches of mirex contained varying amounts of impurities (two were identified, one was hexachlorocyclopentadiene and the other hexachlorobenzene). One sample produced zones of inhibiton on 18 of the 20 cultures tested. Concentrations up to 1000 ppm of "purified" mirex failed to demonstrate any effect on the growth curves of nine pure cultures of bacteria. "Purified" mirex failed to inhibit methane utilization or nitrification by bacteria in estuarine sediments. In pure culture studies, the "purified" mirex also failed to inhibit gelatin hydrolysis, lipid hydrolysis, starch hydrolysis, chitin hydrolysis, ammonification, nitrate reduction, glucose fermentation, methane utilization, and hydrogen sulfide production. Disc assay tests with compounds related to mirex demonstrated that kepone, as well as reduced kepone, and two photoproducts of mirex (10-hydrogen- and 5,10-dihydrogen derivatives) produced zones of inhibition when tested with selected bacterial cultures. On the other hand, the 8-hydrogen- and the 2,8-dihydrogen derivatives of mirex did not produce zones of inhibition. (Author abstract by permission, abridged. Copies of the thesis are available for University Microfilms, Order No. 77-11,750.)

77- 2168. Clark, D. E. (Texas A&M Univ., College Station, TX) **The effect of hexachlorobenzene on in vivo biotransformation, residue deposition, and elimination of certain exogenous compounds and on body weight and organ weight in the rat.** *Diss. Abstr. Int. B.* 37(12 Pt. 1): 6087-B.; 1977. (no references)

Male Sprague-Dawley rats were fed diet containing HCB at 250 ppm for 4 wk. Then they were treated with a

single intraperitoneal injection of 5 mg/kg each of aldrin-^{14}C, 1-naphthol-^{14}C, DDT-^{14}C, HCB-^{14}C, or mirex-^{14}C in peanut oil. Urine, fecal, and tissue samples were collected for assay. There was a change in the relative distribution of radioactivity among the carbon-14 labeled metabolites. There was no evidence of qualitative change in biotransformation of any of the five radioactive test compounds by HCB pretreatment. In HCB fed rats the percentage of carbon-14 associated with the more polar urinary metabolites was increased in the case of aldrin, decreased in the case of HCB, and unchanged in the case of DDT and 1-naphthol. HCB pretreatment reduced renal and adipose residues of aldrin-treated rats, while HCB diet rats injected with DDT-^{14}C or mirex-^{14}C had higher average radiocarbon residue in all tissues. The feces were the primary route of elimination of carbon-14 by rats in both diet groups which were injected with aldrin-^{14}C, HCB-^{14}C, or mirex-^{14}C. Over 95% of the radiocarbon excreted by rats fed either diet and injected with DDT-^{14}C was found in the urine. Metabolites of 1-naphthol-^{14}C were found only in urine. HCB diet rats increased liver weights.

77- 2169. Daughton, C. G. (Univ. California, Davis, CA) **Parathion and acclimated bacteria: interactions in the chemostat and in soil.** *Diss. Abstr. Int. B.* 38(1): 70-B; 1977. (no references)

Parathion may be hydrolyzed by microbes, liberating two moieties: the fairly water-soluble *p*-nitrophenol and the exceedingly soluble ionic diethylthiophosphate. A study was performed to obtain and identify microorganisms capable of growing in continuous culture on parathion as sole carbon and energy source, describe parameters of the hydrolysis, determine the fates of the hydrolysis products, and examine the feasibility of using such bacteria to accelerate degradation of parathion in soil. An adapted defined bacterial community originally enriched from sewage was maintained on parathion or *p*-nitrophenol for two years. The culture contained three bacterial isolates, two of which could grow together symbiotically on parathion, *Pseudomonas aeruginosa* and *P. stutzeri* . Parathion degradation was non-oxidative: it was hydrolyzed by an extracellular enzyme of *P. stutzeri,* then the liberated *p*-nitrophenol was used as sole carbon and energy source by *P. aeruginosa.* Neither species could fulfill the other's function. The maximum dissimilation rate for parathion was 8 g/liter/day. Large concentrations of diethylthiophosphate, accumulated in the culture, were toxic to the cells. The parathion-acclimated culture was extremely effective in degrading parathion in soil.

77- 2170. Oberholser, K. M. ; Wagner, S. R.; Greene, F. E. (Dept. Pharmacol., Pennsylvania State Univ., Coll. Med., Hershey, PA 17033) **Factors affecting dieldrin metabolism by rat liver microsomes.** *Drug Metab. Dispos.* 5(3): 302-309; 1977. (17 references)

Several factors affecting dieldrin metabolism by rat liver microsomes were investigated. Both qualitative and quantitative effects were noted, including formation of metabolites not previously reported. The metabolic profile of dieldrin depends on the concentration of substrate and microsomal protein. Sex, as well as prior exposure to phenobarbital, dieldrin, or DDT, but not to 3-methylcholanthrene, influenced the amount of dieldrin metabolized and the metabolic profile. Cytochrome P-450 and oxygen were needed for formation of all metabolites except one. SKF 525-A or 2,4-dichloro -6- phenylphenoxyethylamine inhibited metabolite formation, in vitro. In the presence of either inhibitor, a metabolite not detected in control incubation mixtures occurred in significant amounts. Individual metabolites isolated from incubation mixtures were tested as substrates for microsomal enzymes as well as for their ability to alter the metabolism of dieldrin. Hepatic microsomal enzymes converted several metabolites to more polar compounds in amounts varying from 3 to 29%. The effect of dieldrin metabolites on the metabolism of dieldrin was complex. Certain metabolites increased the rates of their own metabolism as well as the rate of formation of other metabolites, whereas the major metabolites inhibited formation of all metabolites.

77- 2171. Maziere, M. ; Comar, D.; Marazano, C.; Berger, G. (Dept. Biol. Serv. Hosp. Frederic Joliot, Orsay, France) **Nicotine-^{11}C: Synthesis and distribution kinetics in animals.** *Eur. J. Nucl. Med.* 1(4): 255-258; 1976. (13 references)

In an effort to study in vivo the distribution kinetics of (-)-nicotine in animals, a model was labeled with carbon-11. Two syntheses are described. Immediately after intravenous administration of (-)-nicotine-methyl-^{11}C in rabbits, the gamma-camera showed a strong radioactivity build-up in the brain and kidneys. In mice the most radioactive organs are the kidneys and brain, followed by the liver and lung. Brain activity drops quickly. By its chemical, biological, and pharmacodynamic properties, carbon 11 labeled nicotine is a very useful compound for the study in vivo of certain tobacco-induced damages and for the measurement in vivo of the blood-brain barrier permeability for which it could stand as the reference substance.

77- 2172. Overstreet, D. H. ; Schiller, G. D.; Day, T. A. (Flinders Univ. S. Australia, Sch. Biol. Sci., Bedford Park, S. Australia 5042, Australia) **Failure of cycloheximide to alter rate of recovery of temperature following acute DFP treatment.** *Eur. J. Pharmacol.* 44(2): 187-190; 1977. (11 references)

The relative importance of new synthesis of acetylcholinesterase (AChE) as a means of restoration of function following acute anticholinesterase agent administration is debated. This question was examined by studying the effect of cycloheximide, a protein synthesis inhibitor, on the rate of recovery of temperature following acute administration of DFP. The effect of cycloheximide on the rate of tolerance development was also examined, since it had been proposed that the mechanism in this case is similar to that governing recovery. Cycloheximide administered intraventricularly at 400 μg, 4 hr after im injection of DFP at 1 mg/kg did not alter the rate of recovery of temperature to normal. Tolerance

to the hypothermic effects of DFP developed at the same rate in cycloheximide-treated as in untreated rats. These findings suggest that neither recovery from the acute effects of DFP nor tolerance to its chronic effects depends on protein synthesis.

77- 2173. Chemeris, G. Yu. ; Turusov, V. S. (Author address not given) **Modifitsivnyuschee deistvie DDT i nekotorykh ego metabolitov na toksicheskii effect 7,12-dimetilbenz(a) antratsena [A modifying action of DDT and some of its metabolites on the toxic effect of of 7,12-dimethylbenz(a) anthracene.]** *Vopr. Onkol.* 23(5): 71-75; 1977. (16 references) (Russian)

Preliminary treatment with three injections of DDT at dosages of 10 and 100 mg/kg completely eliminated the lethal effect of DMBA (30 mg/100 g body weight) and prevented or decreased the development of adrenal necrosis. Of the various DDT metabolites investigated (DDT, DDON, DDMU, DDE, DDA, and DBP), DDE rendered the strongest protective action, when administered in a single dose of 10 mg/kg, one day before exposure to DMBA.

77- 2174. Kashyap, S. K. ; Nigam, S. K.; Karnik, A. B.; Gupta, R. C.; Chatterjee, S. K. (Natl. Inst. Occupational Health, Ahmedabad, India) **Carcinogenicity of DDT (dichlorodiphenyl trichloroethane) in pure inbred Swiss mice.** *Int. J. Cancer* 19(5): 725-729; 1977. (12 references)

The carcinogenic action of DDT administered through various routes and at various time intervals was studied in Swiss mice. The inbred mice were treated with technical DDT either orally with the diet or by intubation, subcutaneously, or by skin painting. The duration of the experiment was 80 weeks. There was no difference in body growth and mortality between experimental and control groups. Toxic manifestations of DDT were observed in treated mice in the form of tremors, convulsions, and corneal opacity, usually after 40 weeks. Oral and subcutaneous DDT treatment resulted in a significant increase in the incidence of tumors mainly of lymphoid tissues, lung, and liver. The highest tumor incidence was noted in the group of mice receiving DDT by subcutaneous injection. Males and females were equally susceptible. No evidence of carcinogenicity was noted in the painted group.

77- 2175. Yehia, A. I. A. (Fac. Agric. Assiut Univ., Assiut, Egypt) **The cholinesterase system of four rodent species and the effect of eserine on these enzymes.** *Int. Pest Control* 19(3): 8, 16; 1977. (16 references)

The development of resistance to anticoagulant rodenticides has sparked a search for alternative compounds. It has been suggested that surplus insecticides be used in the field as rodenticides in developing countries. Therefore the cholinesterase system of four rodent species (Norway rat, grey-bellied rat, white bellied rat, and grass rat) were investigated. The theoretical maximum velocities were similar in the four species ranging from 45 to 52.2 μM acetylthiocholine hydrolyzed/g wet weight (brain)/hr. The dissociation constant values were also similar, ranging from 22.2 26.6 M. Reactions with eserine were also similar.

77- 2176. Meikle, R. W. (Dow Chem. U.S.A., Agric. Prod. Dep., Walnut Creek, CA 94598) **Fate of diamidafos in tobacco, cured tobacco, and in smoke.** *J. Agric. Food Chem.* 25(4): 746-752; 1977. (29 references)

Tobacco was treated with diamidafos-^{14}C in transplant water at the rate of 0.33 lb/acre. The following radioactive substances—diamidafos, phenyl β-D-glucopyranoside, an unidentified glycoside of phenol, and nonextractable material, the latter three expressed as phenol—were found in mature fresh leaves at concentrations of 2.61, 0.72, 0.15, and 0.07 ppm, respectively. In cured leaves, the concentrations were 1.29, 0.67, 0.08, and 0 ppm, respectively, when adjusted to an equivalent fresh leaf-weight basis. Smoking effectively destroyed diamidafos and the phenol glycosides in the cigarette tobacco. The major breakdown product in the mainstream smoke was phenol which was already present in much larger quantities as a result of thermal degradation of tobacco. (Author abstract by permission of American Chemical Society)

77- 2177. Minard, R. D. ; Russel, S.; Bollag, J. M. (Pennsylvania State Univ., Dep. Chem. Lab. Soil Microbiol., Dep. Agron., University Park, PA 16802) **Chemical transformation of 4-chloroaniline to a triazene in a bacterial culture medium** *J. Agric. Food Chem.* 25(4): 841-844; 1977. (16 references)

A *Paracoccus* species in an anaerobic medium causes the transformation of 4-chloroaniline into a product identified as 1,3-bis(*p*-chlorophenyl) triazene. The rate at which this process takes place parallels the rate at which the *Paracoccus* species converts nitrate to nitrite and the transformation appears to involve the relatively rapid chemical reactions of diazotization and coupling.

77- 2178. Lichtenstein, E. P. ; Parlar, H.; Korte, F.; Suss, A. (Inst. Ecol. Chem., Radiat. Environ. Res., Munich, Germany) **Identification of [^{14}C]fonofos metabolites isolated from insecticide-treated culture media of the soil fungus** *J. Agric. Food Chem.* 25(4): 845-848; 1977. (7 references)

The degradation of the insecticide [*ring*-^{14}C]fonofos (Dyfonate) and [*ethoxy*-^{14}C]fonofos into water-soluble substances was studied with the soil fungus *Rhizopus japonicus* . After 4 days of incubation of fungal cultures treated with the insecticide, 83% of the applied radioactivity partitioned into the water extraction phase of the culture media, while no radiocarbon could be detected in their hexane extraction phases. In noninoculated controls, however, only 6% of the applied radiocarbon was water-soluble, while 75% still appeared in the hexane extraction phase. After analysis by chromatographic and GC-mass spectrometric methods of water extraction phases of media from [^{14}C]fonofos-treated fungal cultures, the presence of eight compounds was deter-

mined of which four were actual metabolites. Their structure, molecular weight, *Rf* values, and retention times relative to fonofos are shown.

77- 2179. Parthasarathy Pillai, C. G. ; Weete, J. D.; Davis, D. E. (Auburn Univ. Agric. Exp. Stn., Dep. Botany Microbiol., Auburn, AL 36830) **Metabolism of atrazine by metabolites** *J. Agric. Food Chem.* 25(4): 852-855; 1977. (14 references)

The tolerance to atrazine and the translocation and metabolism of this herbicide by the marsh grass *Spartina alterniflora* were studied for 28 days in an atrazine-free solution after an initial 2-day root exposure to the radiolabeled compound. No visual symptoms of atrazine toxicity were observed at the concentrations tested, and *S. alterniflora* was considered at least moderately resistant to this herbicide. Atrazine was readily absorbed by the roots and translocated to the shoots; after 2 days exposure to [^{14}C]atrazine, 90% of the radioactivity was present in shoots. Atrazine was readily metabolized to chloroform, aqueous, and subsequently to insoluble substances. The chloroform fraction, which contained atrazine, showed an initial rapid decrease and then a steady decrease from 84.8 to 23.9% of radioactivity in the total extract. Along with atrazine, three *N*-dealkylation products were identified by thin-layer chromatography: 2-chloro-4-amino- 6-ethylamino- *s*-triazine, 2-chloro -4-amino- 6-isopropylamino- *s*-triazine, and 2-chloro-4,6- diamino-*s*-triazine.

77- 2180. Subba-Rao, R. V. ; Alexander, M. (Cornell Univ., Lab. Soil Microbiol., Dep. Agron, Ithaca, NY 14853) **Cometabolism of products of 1,1,1-trichloro- 2,2-bis(*p*-chlorophenyl) ethane (DDT) by *Pseudomonas putida*** *J. Agric. Food Chem.* 25(4): 855-858; 1977. (14 references)

Pseudomonas putida, an organism capable of utilizing diphenylemthane and benzhydrol as sole sources of carbon, cometabolized bis(*p*-chlorophenyl) methane (DDM) to *p,p'* -dichlorobenzhydrol (DBH), *p,p'*-dichlorobenzophenone (DBP), benzhydrol, benzophenone, *p*-chlorophenylacetic acid, and *p*-chlorophenyl glycolaldehyde. DBH was converted by the resting cells to DBP, benzhydrol, and benzophenone. No products were detected when the bacterium was incubated with DBP. Bis(*p*-chlorophenyl) acetic acid was cometabolized to DDM, DBH, and DBP. The addition of diphenylmethane to the resting cells did not stimulate the cometabolism of DDM, and no new chlorinated products were detected when the bacteria were provided with both substrates. 1,1,1′,1′-Tetra(*p*-chlorophenyl) dimethyl ether was not formed microbiologically from either DDM or DBH.

77- 2181. Tashiro, S. ; Matsumura, F. (Univ. Wisconsin Dep. Entomol., Madison, WI 53706) **Metabolic routes of *cis*- and *trans*-chlordane in rats.** *J. Agric. Food Chem.* 25(4): 872-880; 1977. (7 references)

The major route of metabolism for both *cis*- and *trans* -chlordane is via dichlorochlordene and oxychlordane. These metabolic intermediates are further converted to two key metabolites, 1-*exo*- hydroxy- 2-chlorochlordene and 1-*exo*-hydroxy- 2-*endo*-chloro-2,3-exo- epoxychlordene, which are not readily degraded further. *trans*-Chlordane is more readily metabolized through this route. There is yet another major metabolic route for *cis*-chlordane that involves more direct hydroxylation reactions to form 1-*exo*-hydroxy dihydrochlordenes and 1,2-*trans*-dihydroxy dihydrochlordene. *cis*-Chlordane is more readily degraded through this route. As judged by a toxicity test on mosquito larvae, none of these newly identified metabolites appear to be more toxic than the original chlordanes.

77-2181. Mittelstaedt, W.; Still, G. G.; Duebeck, H.; Fuehr, F. (Radioagron. Working Group, Kernforschungsanlage Juelich GmbH, D-5170 Juelich, Germany) **Extraction and identification of the major metabolites of [carbonyl-^{14}C] methabenzthiazuron after degradation in the soil** *J. Agric. Food Chem.* 25(4): 908-912; 1977. (11 references)

After soil decomposition of [carbonyl-^{14}C] methabenzthiazuron, the metabolite fraction was extracted and separated from the unaltered methabenzthiazuron. Previous studies showed that due to small turnover rates, only limited concentrations of metabolites could be expected. Using HPLC, it was possible to isolate, concentrate, and purify the major metabolite. Its chromatographic properties were identical with 1-methyl-1- (2-benzthiazolyl)urea. The characterization was confirmed by mass spectroscopy fragmentation which yielded a parent ion at m/e 207. The manifold steps of separation and purification lead to relatively high losses. After separation from methabenzthiazuron, the metabolite fraction represented 2.4% of the applied radioactivity. After fractionation on μ-Porasil, only 0.4% was available for MS analysis as major metabolite. About 0.9% was separated and not identified, and 1.1% was used for TLC and LSC counting or lost during evaporation and redissolving, respectively.

77- 2183. Anderegg, B. N. ; Lichtenstein, E. P.; Kemp, J. D. (Univ. Wisconsin, Dep. Entomol. Plant Pathol. Madison, WI 53706) **Effects of lindane on DNA, RNA, and protein synthesis in corn roots** *J. Agric. Food Chem.* 25(4): 923-928; 1977. (21 references)

Corn roots grown in lindane-treated sand, water, or agar were stunted, had club-shaped tips, no lateral roots or root hairs, and had less weight than untreated roots. The insecticide had no effect on protein content of corn roots grown in organ culture on lindane-treated (20 ppm) and untreated agar. Although the amounts of protein per root were considerably less in lindane exposed plant material, the acutal amounts of plant tissues produced were also drastically reduced. Amounts of protein per gram of root tissue produced were similar in control and lindane exposed roots. However, the synthesis of DNA in these roots was reduced due to the effects of the insecticide. At a lindane concentration of 8 ppm in water, the uptake of [^{3}H]thymidine (a DNA precursor) into corn roots and the incorporation of [^{3}H]thymidine into DNA were reduced, particularly after exposure to lindane for

120 h. Such a reduction of DNA synthesis could possibly be related to the effects of lindane in disrupting cell mitosis, which resulted in enlarged cells with multilobed nuclei. The uptake of [^{3}H]uridine (an RNA precursor) by lindane exposed corn roots was also reduced, while the incorporation of the precursor into RNA was increased. Since the amounts of actual RNA in 1 g of fresh root tissue were reduced, a more rapid turnover of RNA in lindane exposed roots was indicated.

77- 2184. Bush, P. B. ; Kiker, J. T.; Page, R. K.; Booth, N. H.; Fletcher, O. J. (Univ. Georgia, Coll. Vet. Med., Ext. Poultry Sci. Dep., Athens, GA 30602) **Effects of graded levels of toxaphene on poultry residue accumulation, egg production, shell quality, and hatchability in white leghorns.** *J. Agric. Food Chem.* 25(4): 928-932; 1977. (20 references)

Graded levels of toxaphene (0, 0.5, 5, 50, and 100 ppm) were added to the diets of female (White Leghorn) chicks from 1 day of age. Each treatment consisted of 90 randomly selected birds (30 birds in each of three replicates). On the sixth week, 20 birds in each replicate were transferred to floor pens and continued into the egg laying phase. Two sexually mature White Leghorn roosters were placed in each pen during the 23rd week. The equation describe the dissipation of toxaphene from adipose and egg tissue. Birds fed 100 ppm toxaphene in their diet did not have significantly weaker shells as measured by Instron stress analysis. Birds fed 5, 50, and 100 ppm toxaphene exhibited sternal or keel deformation at 30 weeks of age. Histopathological examination revealed renal lesions in birds fed toxaphene at 50 and 100 ppm. Toxaphene at 100 ppm did not significantly alter egg production, hatchability, or fertility.

77- 2185. Umetsu, N. ; Grose, F. H.; Allahyari, R.; Abu-El-Haj, S.; Fukuto, T. R. (Dep. Entomol., Div. Toxicol. Physiol., Univ. California, Riverside, CA 92521) **Effect of impurities on the mammalian toxicity of technical malathion and acephate.** *J. Agric. Food Chem.* 25(4): 946-953; 1977. (17 references)

A number of impurities present in technical malathion and acephate were isolated by column and thin-layer chromatography and the structures of 11 impurities in malathion and seven impurities in acephate were determined by nuclear magnetic resonance, infrared and mass spectroscopy, and by gas and thin-layer chromatography. Several of the impurities potentiated rat toxicity of purified malathion, and highest potentiating activity was observed with *O,S,S*-trimethyl phosphorodithioate and the *S*-methyl isomeride of malathion. Potentiating effects were significantly smaller in the mouse compared with the rat. Of the impurities isolated from acephate, *O,O,S*-trimethyl phosphorothioate showed slight potentiation of mouse toxicity when added to purified acephate, but an antagonizing effect was observed with *O,O*-dimethyl *N*-acetyl phosphoramidothioate. Storage of technical malathion for 3 to 6 months at 40 C resulted in materials which were noticeably more toxic to mice. In contrast, a significant reduction in mouse toxicity was observed after storage of technical acephate under the same conditions.

77- 2186. Fung, K. K. H. ; Uren, N. C. (La Trobe Univ., Sch. of Agric., Bundoora, Victoria, 3083, Australia) **Microbial transformation of *S*-methyl *N*-[methylcarbamoyl)oxy] thioacetimidate (methomyl) in soils** *J. Agric. Food Chem.* 25(4): 966-969; 1977. (7 references)

Microbial transformations of methomyl in two tobacco-growing soils were determined in a perfusion study where the soils (10 g) were perfused with aqueous solutions (230 cm^3) containing 6 ppm of methomyl with and without sodium azide. Adsorption of methomyl was indirectly assessed. The contribution of adsorption to the loss of methomyl from solutions was small (approximately 5%) when compared with that of microbial transformation. Microbial transformation of methomyl in both soils occurred after a lag phase of about 7 to 14 days. However, in enriched soils, transformation occurred with virtually no lag phase.

77- 2187. Szokolay, A. ; Madaric, A.; Uhnak, J. (Res. Inst. Hyg., 882 01 Bratislava, Czechoslovakia) **Relative cumulation of β-BHC in ecological and biological system.** *J. Environ. Sci. Health* B12(3): 193-212; 1977. (35 references)

A total of 1234 samples of different elements of the food chain from three regions of Slovakia were analyzed in 1974. The aim of the study was to assess ecological relations of the residue dynamics of four isomers of BHC in comparison to *p,p'*-DDT and DDE. Higher relative accumulation of β-BHC in animal food products compared to the other isomers was found; this contrasts with most literature data. The observed relationships between the BHC isomers were verified in a model feeding experiment on poultry. After four weeks of feeding individual or mized isomers to poultry the greater accumulation tendency of β-BHC was confirmed. Interconversion of BHC isomers in chickens did not seem to be occurring. The levels of the BHC isomer residues in the tissues of laying hens reached a maximum four weeks after feeding; however, deposition of β-BHC in eggs was apparently still continuing at that time. Accumulation of α-BHC in tissues and in eggs was not observed.

77- 2188. Kohli, K. K. ; Chandrasekaran, V. P.; Venkitasubramanian, T. A. (Vallabhbhai Patel Chest Inst., Univ. Delhi, India) **Stimulation of serotonin metabolism by dieldrin** *J. Neurochem.* 28(6): 1397-1399; 1977. (28 references)

A study was made of the effect of dieldrin on serotonin metabolism. Feeding of a single oral dose of dieldrin (30 mg/kg) increased the level of 5-hydroxytryptamine (5-HT), 5-hydroxyindoleacetic acid (5-HIAA), and tryptophan in the rat brain. 5-HT and 5-HIAA levels were increased due to increased concentrations of brain tryptophan, which in turn may be due to an increase in plasma trypotophan. The results of this study indicate that effects of dieldrin are similar to those of DDT.

77- 2189. Robinson, C. P. ; Choi, J. J.; Pento, J. T. (Coll. Pharm., Univ. Oklahoma, Oklahoma City, OK 73190) **Enhancement of intestinal glucose transport following chronic parathion poisoning** *J. Pharm. Sci.* 66(6): 879-880; 1977. (15 references)

The effects of acute exposure to parathion and its active metabolite paraoxon and of chronic parathion poisoning on intestinal glucose transport were investigated. Chronic administration of parathion to male rats stimulated glucose, but not calcium, transport in the everted duodenal gut sac preparation. Chronic parathion stimulation was not reduced by concurrent administration of atropine. Acutely applied parathion or paraoxon did not increase glucose transport in this preparation.

77- 2190. Blevins, R. D. ; Lijinksy, W.; Regan, J. D. (E. Tennessee State Univ., Dep. Health Sci., Johnson City, TN 37601) **Nitrosated methylcarbamate insecticides: effect on the DNA of human cells** *Mutat. Res.* 44(1): 1-7; 1977. (10 references)

Normal human skin cells were treated with six insecticidal esters of *N*-methylcarbamic acid or their *N*-nitroso derivatives. The DNA of the cells was sedimented in alkaline sucrose gradients at various times after treatment. The insecticides used were aldicarb, baygon (propoxur), BUX-TEN (bufencab), carbofuran, landrin, and methomyl. Numerous single-strand breaks were apparent in the DNA of all the nitroso derivative-treated cells but not in the DNA of those treated with the parent insecticides. Since the effect of the nitroso derivatives on the DNA could be observed for at least 20 h after removal of the chemical from the cultures, the DNA repairing events normally occurring in human cells after damage initiated by these chemical agents was not repaired as UV-type DNA damage or ionizing-type DNA damage in human cells. These observations suggest that the human cellular DNA in vivo is irreversibly altered by nitrosated *N*-methyl carbamate insecticides resulting in numerous alkali-sensitive bonds.

77- 2191. Block, A. M. ; Bhajan, W. R.; Estevez, J.; Newland, L. W. (Univ. Puerto Rico, Rio Piedras, PR) **The electrochemical reduction model of anaerobic degradation of the gamma isomer of 1,2,3,4,5,6-hexachlorocyclohexane (Gamma-BHC).** *J. Water Pollut. Control Fed.* 49(5): 857-859; 1977. (16 references)

The usefulness of electrochemical reduction modeling of the anaerobic digestive degradation of lindane was recently pointed out, and the anaerobic organisms responsible for degradation were discussed. Experimental as well as theoretical evidence has been obtained of the ease of anaerobic degradation of lindane relative to the corresponding slow aerobic pathways. The theoretical calculations neglected some potentially important factors but were in agreement with experimental findings. The findings that lindane is short-lived under anaerobic (flooded soil) conditions contrasts with previous observations that soil bacteria are practically indifferent to lindane. Differences in oxygen levels and therefore bacterial predominance may explain this difference. Enrichment studies have suggested that *Clostridium* affects lindane. Lindane has been shown to be metabolized by unicellular algae in synthetic media. Anaerobic degradative processes for lindane have been rather clearly reproduced except for incomplete recovery of benzene, which leaves room for interpretation. It was unexpectedly discovered that microorganisms present in simulated anaerobic lake impoundments are able to isomerize BHC. This may have serious experimental implications, since δ-BHC is much less soluble in water than the other isomers and tends to be released to the atmosphere.

77- 2192. Sekiguchi, Y. ; Kobayashi, N.; Nagae, K. (Natl. Agric. Chem. Infest. Stn., Minist. Agric. For., Kodaira, Tokyo, Japan) **[Recently registered agricultural chemicals (pesticides).]** *Kongetsu No Noyaku (Agric. Chem. Mon.)* 21(9): 122-125; 1977. (no references) (Japanese)

Three pesticides for agriculture, *N*-(*p*-fluorophenyl)-dichloromaleimide (fluoromide) 75% WP fungicide, 2-dimethylamino- 6-methylpyrimidin- 4-yl dimethyl phosphorothionate (pirimiphos-methyl) 45% EC insecticide, and *O*-ethyl *O,O*-di(2,4-dichlorophenyl) phosphate (phosdiphen) plus kasugamycin-HCl 2% plus 0.11% dust, were introduced. The acute oral LD50 values of fluoroimide in the mouse and rat are respectively > 5,000 and 10,000 mg/kg. That of pirimiphos-methyl to the female and male mouse is respectively 1,383 and 1,050 mg/kg. That of phosdiphen to male rat and male mouse is respectively 6,221 and 1,700 mg/kg. The tlm (48 hrs) of these three pesticides (technical grade) to carp is 5.6, 0.4 and 1.69 ppm, respectively.

77- 2193. Scheele, B. ; Fuehr, F.; Krampitz, G. (Arbeitsgruppe Radioagron. Kernforschunganlage Juelich, Juelich, Germany) **Untersuchungen zu Umsatz und Stoffwechsel von carbonyl-^{14}C- Markiertem Azinphos-methyl im Huhn. [Investigations into excretion and metabolism of carbonyl-^{14}C-labeled azinphosmethyl in the chicken.]** *Landwirtsch. Forsch.* 30(1): 56-68; 1977. (19 references) (German)

^{14}C-Azinphosmethyl labeled on the carbonyl carbon was administered orally at two different dosages or intravenously to chickens. Between 72% and 87% of the oral or intravenous dose was excreted in the feces in 24 hr. Most of the excreted radioactivity was converted to water-soluble compounds. Maximum values of azinphosmethyl equivalents were reached in kidneys and liver. Radioactivity was also detected in the gall bladder and in the eggs. The total amount of radioactivity in eggs did not exceed 0.1% of the (daily) administered dosage per egg. Radioactivity in the blood reached a maximum 1-2 hr after oral administration. After intravenous administration the blood radioactivity levels decreased rapidly, and after 5 min represented only ca. 5% of the applied dose. Most of the radioactivity present in the blood was present in the polar fractions, and therefore was not unchanged azinphosmethyl. Most of the radioactivity present 1.25 hr after a single oral dose was in the upper alimentary canal, but some had already reached the colon, cloa-

ca, and cecum. At 3 hr after oral administration about 16% of the administered radioactivity was still present in the form of unchanged azinphosmethyl in the intestines and excreta.

77- 2194. Metcalf, R. L. (Aerosp. Med. Res. Lab., Wright-Patterson AFB, OH) **Development of laboratory model ecosystems as early warning elements of environmental pollution** *Natl. Tech. Inform. Serv.* AD-A011,851, 12p.; 1974.

To date the authors have studied the fate of approximately 100 organic compounds in the several types of model ecosystems described. The use of the model ecosystem technology provides a reltively simple way to measure the environmental toxicology and degradation pathways for new compounds in a variety of organisms. Model ecosystems are invaluable for screening new compounds for environmental persistence and degradation to demonstrate which of many possible derivatives or modifications are least hazardous to environmental quality. Model ecosystems provide the only practical way to study the complex interactions involved in the biological behavior of mixtures of environmental pollutants. Finally, model ecosystem studies are unusually graphic and visually appealing and have considerable teaching value for study of the problems of environmental micropollution. (Author abstract by permission)

77- 2195. Alexander, M. (Dep. Agron., Cornell Univ., Ithaca, NY) **Microbial degradation of DDT** *Natl. Tech. Inform. Serv.* AD-A012,840, 19p.; 1975. (no references)

Pseudomonas putida, an organism capable of utilizing diphenylmethane as sole source of carbon and energy, converted bis(*p*-chlorophenyl)acetic acid to bis(*p*-chlorophenyl)methane, 4,4′-dichlorobenzhydrol, and 4,4′-dichlorobenzophenone. This is the first report of such dehalogenations of ring chlorines derived from DDT. *Pseudomonas putida* was also shown to convert diphenylmethane to benzhydrol and benzophenone. The organism was also found to be capable of ring cleavage of diphenylmethane and benzhydrol, producing phenylacetic and phenylglycolic acids, respectively. Studies were conducted to assess the effect of salinity, temperature, oxygen tension and presence of sediment, organic nutrients, and algal cells on the decomposition of DDT in model marine ecosystems. In the model ecosystems receiving the alga *Cylindrospermum* sp. or diphenylmethane, DDD, DDE, and DBP were formed from DDT. DDT and its breakdown products had no significant effect on respiration of microbial communities or algal productivity. (Author abstract by permission)

77- 2196. Hovenac, J. W. ; Broomfield, C. A.; Steinberg, G. M.; Lanks, K. W.; Lieske, C. N. (Edgewood Arsenal, Aberdeen Proving Ground, MD) **Spontaneous reactivation of acetylcholinesterase following organophosphate inhibition. I. An analysis of anomalous reactivation kinetics** *Natl. Tech. Inform. Serv.* AD-A015,562, 15p.; 1975.

The first kinetics studies on the spontaneous reactivation of sarin-inhibited acetylcholinesterase are reported. Evidence is presented to challenge the widely accepted position that the aging of alkyl-alkoxy phosphorylated acetylcholinesterases is solely acid-catalyzed. (Author abstract by permission)

77- 2197. Weeks, M. H. ; Angerhofer, R. A.; Davenport, C. D. (Army Environ. Hyg. Agency, Aberdeen Prov. Ground, MD) **Preliminary assessment of the acute toxicity of malathion in animals** *Natl. Tech. Inform. Serv.* AD-A016,146, 27p.; 1975. (no references)

Studies were conducted to acquire information concerning the acute toxicity of malathion in animals under various conditions of exposure. The responses in rabbits and quail exposed to aerosols generated from technical grade malathion (95 percent) and approximating an ultra-low volume ground spray were compared with those from a 6 percent malathion/No. 2 fuel oil mixture simulating a high volume spray. Results indicate that technical grade malathion (95 percent) as an ultra-low volume spray and at effective insecticidal concentrations in particle sizes having a mass median diameter of about 12 micrometers is relatively nonhazardous compared to the possible toxic fuel oil effects of a 6 percent malathion/No. 2 fuel oil mixture with a mass median diameter of 25 micrometers. Based on blood plasma cholinesterase activity analyses, quail were more sensitive to equivalent malathion exposure concentrations than were rabbits. Oral administration of technical grade malathion to rabbits resulted in reduction of plasma and erythrocyte cholinesterase activity in dosages of 120, 300 and 600 mg/kg with death resulting from 1200 mg/kg. (Author abstract by permission)

77- 2198. Angerhofer, R. A. ; Fisch, H.; Nelson, J. H. (Army Environ. Hyg. Agency, Aberdeen Prov. Ground, MD) **Hazard evaluation of candidate dog flea collar impregnant** *Natl. Tech. Inform. Serv.* AD-A017,500, 9p.; 1975. (no references)

A hazard evaluation of dog flea colla impregnated with *O,O*-dimethyl- *O*-(3,5,6-trichloro- 2-pyridyl) phosphate (chlorpyrifos-methyl), was performed by means of a 42-day wear test in male beagle dogs. A 15% formulation of the technical grade compound impregnated in plastic collars caused a mean depression of 12% of pretreatment levels in plasma cholinesterase activity through the first 28 days of the study. With the exception of slight cervical skin erythema in exposed and control animals, no adverse clinical signs were noted. It was recommended that the collar formulation tested be approved for wearing by dogs trained for military purposes and used by the US Army. While these collars are being worn, necks of the animals should be observed daily for signs of irritation. If skin irritation develops, the collar should be removed from the affected dog. It was further recommended that behavioral studies in test animals should be performed prior to the use of the these collars on dogs used for duties requiring acute response to stimuli. (Author abstract by permission)

77- 2199. Grant, C. L. ; Downer, R. J.; Nielsen, J. P.; Keegan, R. E.; Hagmann, E. L. (Center Ind. Inst. Dev., New Hampshire Univ., Durham, NH) **A study to understand the environmental and ecological impact of marine sand and gravel mining in order to prepare guidelines for mining operations in the sea -- chemical characterization of core samples from** *Natl. Tech. Inform. Serv.* COM-75-10714, 91p.; 1974. (no references)

The chemical analysis of marine bottom sediments provides valuable information concerning the composition of the sediments themselves as well as the effects of sediments on the overlying water mass and the biological systems which exist at the sediment-water interface. This report's investigations have shown that the dredge spoils are unlikely to induce significant trace metal contamination to the surface water by a desorption mechanism. Consequently, the major source of trace metal additions to the water will be the dredge apparatus and associated activities. (Author abstract by permission)

77- 2200. Armstrong, D. A. ; Millemann, R. F. (Mar. Sci. Center, Oregon State Univ., Newport, OR) **Effects of the insecticide sevin and its first hydrolytic product, 1-naphthol, on some early developmental stages of the bay mussel, edulis** *Natl. Tech. Inform. Serv.* COM-75-10967, 8p.; 1974. (no references)

Six developmental stages of the bay mussel, *Mytilus edulis*, from fertilization to 32 hours after fertilization, and also unfertilized eggs, were exposed for one hour to different concentrations of the insecticide Sevin (carbaryl) and its first hydrolytic product, 1-naphthol. After exposure, the larvae or eggs were separated from the pesticide solution and returned to clean water. At 48 hours after fertilization, the numbers of normal and abnormal larvae were determined and 1-h EC50 values (the effective concentrations that caused anomalous development of 50% of the test animals) were calculated. The most sensitive developmental stage was the one that occurred shortly after fertilizationat the time of appearance of the first polar body. Thereafter, sensitivity decreased as age increased. (Author abstract by permission)

77- 2201. Benschop, H. P. ; Dejong, L. P. A.; Kienhuis, H.; Vink, J. A. J.; Berends, F. (Chem. Lab., RVO-TNO, Rijswijk, The Netherlands) **A structure activity study of oximes aiming at prophylaxis against organophosphates** *Natl. Tech. Inform. Serv.* N75-29744, 28p.; 1974. (no references)

Development of oximes as antidotes to poisoning by organophosphorus compounds and other anticholinesterases of high toxicity is investigated. These oximes should be potent reactivators, have low toxicity and be excited and transformed slowly by that body. Properties of synthesized oximes evaluated are: reactivating potency in vitro, toxicity in mice, biological half life in the blood of rats and rabbits after intravenous injection, and prophylactic activity against Sarin in mice. Penetration into the central nervous system of a number of the oximes was investigated using rats. (Author abstract by permission)

77- 2202. Midwest Res. Inst. (Kansas City, MO) **Substitute chemical program. Initial scientific and minieconomic review of captan** *Natl. Tech. Inform. Serv.* PB-242,559, 184p.; 1975. (no references)

This is the 5th in a series of in-depth scientific literature searches which review the safety and efficacy of substitute chemicals registered by EPA as possible replacements for cancelled or suspended pesticides or pesticides in litigation. The review covers all uses of captan and is intended to be adaptable to future needs. Chemistry, pharmacology and toxicology, fate and significance in the environment, and production and use are reviewed. (Author abstract by permission)

77- 2203. Liu, D. H. W. ; Lee, J. M. (Stanford Res. Inst., Menlo Park, CA) **Toxicity of selected pesticides to the bay mussel** *Natl. Tech. Inform. Serv.* PB-243,221, 111p.; 1975. (no references)

The toxicity of the insecticides carbaryl, methoxychlor, and malathion and of the herbicides trifluralin and 2,4-D to the bay mussel (Mytilus edulis) was investigated. Toxic effects were measured in terms of survival of and byssus-thread attachment by adults, embryo shell development, and larval growth and metamorphosis. The results indicated that growth was the most sensitive measure of toxicity. All the pesticides produced statistically significant ($p = 0.05$) reductions in larval shell length after 10 to 20 days of exposure. Relative to potency, methoxychlor was the most toxic, and 2,4-D was the least toxic. The effects on embryo development of delaying the time of fertilization and of using seawater larval culture media by various ages also were studied, and substrate preference by metamorphosing larvae was investigated. (Author abstract by permission)

77- 2204. Midwest Res. Inst. (Kansas City, MO) **Substitute chemical program. Initial scientific and minieconomic review of aldicarb** *Natl. Tech. Inform. Serv.* PB-243,743, 130p.; 1975. (no references)

This is the sixth in a series of in-depth scientific literature searches which review the safety and efficacy of substitute chemicals registered by EPA as possible replacements for cancelled or suspended pesticides or pesticides in litigation. The reviews are part of the Substitute Chemical Program, initiated under PL 93-135 (October 1973). This report is on aldicarb, a registered substitute chemical for certain cancelled and suspended uses of DDT. Where applicable, it also identifies areas where technical data may be lacking so that appropriate studies may be initiated to develop desirable information. The review covers all uses of aldicarb and is intended to be adaptable to future needs. The data contained in this report was not intended to be complete in all areas. The report summarizes rather than interprets scientific data reviewed during the course of the studies. Data is not correlated from different sources. Opinions are not given on contradictory findings. (Author abstract by permission)

77- 2205. Ferebee, R. N. (Dep. Microbiol., Clemson Univ., SC) **The effects of selected herbicides on bacterial populations in an aquatic environment** *Natl. Tech. Inform. Serv.* PB-243,884, 100p.; 1972. (no references)

A laboratory culture system was used to continuously culture mesophilic, heterotrophic bacteria derived from a freshwater reservoir. Alterations in bacterial numbers and diversity of genera were studied both before and after additions of selected herbicides. Identical techniques for isolation and identification were used to compare culturable heterotrophic bacteria from a freshwater reservoir with those in the laboratory culture system. Three chemicals, representing the phenoxyalkanoic acid, substituted urea, and dipyridyl classes of herbicides, were added to circulating vat culture vessels which contained untreated reservoir water. The herbicides tested all remained qualitatively measurable in the culture system for three weeks. (Author abstract by permission)

77- 2206. Bourquin, A. W. (Environ. Prot. Agency, Gulf Breeze Environ. Res. Lab., Gulf Breeze, FL) **Microbial-malathion interaction in artificial salt-marsh ecosystems. Effect and degradation** *Natl. Tech. Inform. Serv.* PB-246,251, 51p.; 1975. (no references)

Malathion is rapidly degraded in vitro by salt-marsh bacteria to malathion-monocarboxylic acid, malathion-dicarboxylic acid and various phosphothionates as a result of carboxyesterase cleavage. In addition, some expected phosphatase activity produces desmethyl-malathion, phosphothionates, 4-carbon dicarboxylic acids, and corresponding ethyl esters. In a simulated salt-marsh environment, malathion is degraded by the indigenous bacteria community. Numbers of bacterial capable of degrading malathion in the presence of added nutrients increase in the sediments with increasing frequency of application and in the water column with the increasing level of treatment. Numbers of bacteria which degrade malathion as a sole carbon source are linked to the level of treatment in sediments and the frequency of treatment in the water column; however, these bacteria do not appear to play a significant role in the dissipation of malathion. The disappearance of malathion in the salt-marsh environment is influenced by both chemical and biological degradation; however, at temperatures below 26C and salinities below 20 parts per thousand by weight, chemical mechanisms appear to be of less importance than biological degradation. (Author abstract by permission)

77- 2207. Houston, C. W. (Dep. Microbiology, Rhode Island Univ., Kingston, RI) **Biodegradation of aquatic pollutants** *Natl. Tech. Inform. Serv.* PB-246,273, 39p.; 1975. (no references)

Organisms isolated from commercial turf farm soil and identified as species of the genus, *Pseudomonas*, were used to study the utilization of three phenoxy herbicides. 2,4-dichlorophenoxyacetic acid (2,4-D) was readily attacked in a mineral salts medium. 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) and 2-(2,4,5-trichlorophenoxy)-propionic acid (2,-4,5-TP) were attacked only in the presence of a growth substrate such as sodium benzoate. Cell yield on benzoate with the latter two compounds did not differ, suggesting a co-metabolic attack. Small quantities of peptone and/or beef extract had little effect on cell yield but markedly increased herbicide utilization. The observed recalcitrance of at least some organics may be attributed to stringent enrichment isolation procedures which do not allow isolation of actively degrading organisms. Similarly, persistence in the environment may be due, in part at least, to the slow attack in the absence of the stimulatory effect of soluble organic compounds, which are of a transient nature in soil and water. (Author abstract by permission)

77- 2208. Christensen, H. E. ; Luginbyhl, T. T.; Carroll, B. (Natl. Inst. Occup. Saf. Health, Rockville, MD) **Registry of toxic effects of chemical substances, 1975 edition** *Natl. Tech. Inform. Serv.* PB-246,557, 1399 p.; 1975. (no references)

The 1975 Edition of the Registry of Toxic Effects of Chemical Substances, formerly known as the NIOSH toxic substances list, is the fifth Edition prepared in compliance with the requirements of the Occupational Safety and Health Act of 1970 (PL-91-596). This Registry contains toxicity information on approximately 17,000 unique chemical substances along with about 48,000 synonyms. Information is given on route of entry, toxic dose and toxic effects including an indication of existing evidence.

77- 2209. Stein, K. ; Portig, J.; Koransky, W. (Inst. Toxikol. Pharmakol., Philipps-Univ., Marburg/Lahn, Germany) **Oxidative transformation of hexachlorocyclohexane in rats and with rat liver microsomes** *Naunyn-Schmiedebergs Arch. Pharmacol.* 298(2): 115-128; 1977. (35 references)

Rat liver microsome suspensions incubated with BHC in the presence of NADPH and air accumulate 2,4,6-trichlorophenol (2,4,6-TCP), a major BHC metabolite in rats. Cytochrome P-450 is apparently involved in this process. The rate of 2,4,6-TCP formation from individual BHC isomers differed in a manner corresponding to that seen in vivo. Hy-

droxylation may be assumed to be the initial step in the reaction sequence for 2,4,6-TCP formation. This sequence would explain the formation of symmetrical TCP in vitro from α-, β-, δ-, and E-BHC. The differences in accessibility of carbon-hydrogen bonds which exist for the different isomers of BHC provide a reasonable explanation for the differences in their rates of conversion of 2,4,6-TCP. Lindane on the other hand is converted to several chlorophenols, including 2,4,6-TCP, and a tetrachlorophenol, presumably 2,3,4,6-tetrachlorophenol. The formation of 2,4,5-TCP from lindane in vitro is largely independent from that of 2,3,4,6-tetrachlorphenol. The formation of the latter may be a result of hexachlorocyclohexene hydroxylation. (Author abstract by permission, abridged.)

77- 2210. Grajewski, O. ; Oberdisse, E. (Pharmakol. Inst., Freie Univ. Berlin, D-1000 Berlin 33, Germany) **Increase of serum very low density lipoproteins in rats after administration of α-hexachlorocyclohexane** *Naunyn-Schmiedebergs Arch. Pharmacol.* 298(2): 129-135; 1977. (43 references)

Following administration of α-BHC at 200 mg/kg to female Wistar rats by stomach tube, the animals develop hyperlipemia. Serum triglycerides are increased by 300% at 48 hr after administration of α-BHC, while serum cholesterol and serum total phosphates increased by only about 45% each. Serum free fatty acids are not significantly altered. Fractionation of serum lipoproteins by ultracentrifugation shows that hyperlipemia is comprised of a five-fold increase in serum very low density lipoproteins. Hepatic triglyceride secretion is increased in α-BHC pretreated animals; drugs which diminish hepatic triglyceride secretion reduce the α -BHC induced hyperlipemia. The blood sugar level was also decreased in fasting animals after treatment with α-BHC, apparently due to decreased hepatic glyconeogenesis. (Author abstract by permission, abridged)

77- 2211. Schulte-Hermann, R. ; Landgraf, H.; Koransky, W. (Inst. Toxicol. Pharmakol., Philipps-Univ., Marburg/Lahn, Germany) **Effect of hypophysectomy on the stimulation of liver growth by α-hexachlorocyclohexane, phenobarbital, and partial hepatectomy in the rat** *Naunyn-Schmiedebergs Arch. Pharmacol.* 298(2): 137-142; 1977. (31 references)

BHC and phenobarbital are known to elicit size increases and cell multiplication in rat liver. In hypophysectomized rats these compounds induce an increase in liver mass but no increase in liver DNA. Hypophysectomy without additional treatment results in a decrease of liver size and RNA, while the DNA content remains unchanged, leading to a relative DNA surplus. A 1/3 hepatectomy in hypophysectomized animals results in only a small increase in hepatic DNA; after 2/3 hepatectomy 75-80% of the original liver DNA are restored. Liver DNA losses are known to be restored completely in rats with intact hypophysis. Thus the relative DNA surplus in hypophysectomized rats appears to prevent stimulation of DNA synthesis by weak growth stimuli such as α-BHC, phenobarbital, and 1/3 hepatectomy. If the relative DNA surplus is eliminated by partial hepatectomy the inducers do produce DNA multiplication. It is concluded that the induction of liver growth and cell multiplication by α-BHC and phenobarbital does not require the presence of the hypophysis or one of its hormones.

77- 2212. Kuhr, R. J. ; Hessney, C. W. (New York State Agric. Exp. Stn., Dep. Entomol., Geneva, NY 14458) **Toxicity and metabolism of methomyl in the European corn borer** *Pestic. Biochem. Physiol.* 7(4): 301-308; 1977. (10 references)

Methomyl had similar contact and oral toxicities for two different strains of European corn borer, *Ostrinia nubialis* (Huebner). The third- and fourth-instar larvae were equally susceptible in each case, but fifth-instar insects were considerably more difficult to kill. Studies performed in vivo and in vitro revealed that borers from both strains possessed mixed-function oxidase systems and were thus capable of metabolizing methomyl to water-soluble products, incapable of cleavage by acid or hydrolytic enzymes. The greatest metabolic activity by far was localized in fat body tissues of last-instar larvae. The two test strains metabolized methomyl at a similar rate, but a large difference was found in the rate of methomyl oxime metabolism.

77- 2213. Kurihara, N. ; Nohta, M.; Tanaka, K.; Kiso, M.; Fujita, T.; Nakajima, M. (Kyoto Univ., Dep. Agric. Chem. Radioisotope. Res. Cent., Kyoto, Japan) **Metabolic detoxication and synergistic ratio of lindane analogs in house flies** *Pestic. Biochem. Physiol.* 7(4): 332-340; 1977. (15 references)

The biodegradability of lindane analogs was examined using housefly whole body, microsomes, and microsome supernatant fractions. In the whole body experiments and with microsomes in the presence of NADPH it decreased in the order alkoxy ° methylthio > methyl analogs > lindane. A different trend was observed with the supernatant in the presence of glutathione. The synergistic effects of piperonyl butoxide applied together with lindane analogs were mostly explained by inhibition of microsomal metabolism. Piperonyl butoxide also inhibits the penetration of compounds into the fly body and makes the central nervous system of American cockroaches less sensitive to the action of insecticides causing after discharges and repetitive discharges. The percentage of metabolic disappearance of insecticides within a certain time increased with increasing initial dose level in the whole body experiments.

77- 2214. Roberts, T. R. (Shell Res. Ltd., Woodstock Lab., Sittingbourne Res. Cent., Sittingbourne, Kent, ME9 8AG, England) **The metabolism of the herbicide flamprop-isopropyl in barley** *Pestic. Biochem. Physiol.* 7(4): 378-390; 1977. (7 references)

The metabolism of flamprop-isopropyl, a wild oat herbicide, in barley grown to maturity was examined under

glasshouse and outdoor conditions, using flamprop-isopropyl labeled separately at two positions with ^{14}C. The major metabolic pathway of the herbicide took place by hydrolysis to the corresponding carboxylic acid in free and conjugated forms. Flamprop-isopropyl also underwent hydroxylation at positions 3 and 4 of the benzoyl group. The 3-hydroxybenzoyl analog of the carboxylic acid was detected. Plants also contained the hydroxylated metabolites in conjugated form. Other minor metabolites were detected only in the glasshouse experiments: *N*-benzoyl- 3-chloro- 4-fluoroaniline, 2-(3-chloro- 4-fluorophenylamino)- propionic acid, and benzoic acid. Some of the herbicide spray reached the soil on which the plants were grown; at barley harvest residues in the 0-10 cm layer comprised the unchanged herbicide, the carboxylic acid, and unidentified polar material.

77- 2215. Soderlund, D. M. ; Casida, J. E. (Univ. California, Pestic. Chem. Toxicol. Lab., Dep. Entomol. Sci., Berkeley, CA 94720) **Effects of pyrethroid structure on rates of hydrolysis and oxidation by mouse liver microsomal enzymes** *Pestic. Biochem. Physiol.* 7(4): 391-401; 1977. (19 references)

Metabolism rates of 44 pyrethroids and 24 model compounds in rat liver microsomal systems were examined. On the basis of these studies the substrates could be divided into three groups based on their ease of hydrolysis and oxidation. The primary alcohol esters of *trans*-substituted cyclopropanecarboxylic acids are most rapidly metabolized. The major component of their total metabolism rate is generally hydrolysis. The primary alcohol *cis*-substituted cyclopropane carboxylates, tetramethyl cyclopropane carboxylates, and *p* -chlorophenyl-α- isopropylacetates are rapidly oxidized or are hydrolyzed slowly or at undetectable rates. Least susceptible to metabolic attack are the highly insecticidal α-cyano-3- phenoxybenzyl esters. This is due both to their reduced esterase rates (attributable to α-substitution in the alcohol moiety) and to reduced oxidase rates, for which no explanation is currently available. Other differences in structures in the acid and alcohol moieties are less important in determining the metabolism rates.

77- 2216. Kiso, M. ; Nohta, M.; Tanaka, K.; Kurihara, N.; Fujita, T.; Nakajima, M. (Kyoto Univ., Dep. Agric. Chem. Radiosotpe. Res. Cent., Kyoto, Japan) **Insecticidal activity and microsomal metabolism of biooxidizable lindane analogs** *Pestic. Biochem. Physiol.* 7(4): 341-348; 1977. (18 references)

Insecticidal activity against mosquitos, houseflies, and German cockroaches was examined for lindane analogs in which some chlorine atoms were replaced by other groups susceptible to microsomal oxidative metabolism. Some of these analogs, especially a methylthio analog, were highly active. The highly insecticidal methylthio, ethoxy, and methyl analogs appear to undergo effective metabolic detoxication in house flies according to the ratio of their synergized and unsynergized LD50 values, and in in vitro experiments using the microsomal fraction from house fly abdomen. Agreement between the synergized insecticidal activities of these compounds against various insect species suggest that oxidative degradation is uniformly limited by synergist and that transport to the action site is not important in determining relative insecticidal activity.

77- 2217. Mason, R. P. ; Peterson, F. J.; Holtzman, J. L.; Callaghan, J. T. (VA Hosp., Minneapolis, MN 55455) **Ascorbic acid destruction of the O_2 generated by nitrofurantoin and paraquat free radicals** *Pharmacologist* 19(2): 192; 1977. (no references)

According to earlier studies nitrofurantoin and *p*-nitrobenzoate are enzymatically reduced to free radical ions which in turn reduce oxygen to superoxide radicals. Later investigations suggested that nitrofurantoin-induced pulmonary reactions may produce lung toxicity through reductive activation of oxygen. Ascorbic acid is known to reduce superoxide radicals to hydrogen peroxide, and therefore adrenochrome formation was used to monitor the effect of nitrofurantoin and ascorbic acid on superoxide generation by rat hepatic microsomes. Microsomal oxidation of NADPH results in formation of only small amounts of adrenochrome during the first 30 sec. This basal rate is completely inhibited by ascorbic acid (100 μ*M*) or superoxide dismutase (1 μ g/ml). Addition of nitrofurantoin causes a 12-fold increase in the initial adrenochrome production rate to 34 nmole/min-mg, which is inhibited 66% by ascorbic acid and 49% by superoxide dismutase. Under the same conditions paraquat at 500 μM increases adrenochrome formation 9-fold to 27 mole/min-mg, and this reaction is inhibited 94% by ascorbic acid and 36% by superoxide dismutase. Thus it appears that the protective effect of ascorbic acid in nitrofurantoin toxicity may be due to reduction of superoxide radicals, and ascorbic acid may be an effective antidote for paraquat poisoning.

77- 2218. Bulger, W. H. ; Kupfer, D. (Worcester Fdn. Exp. Biol., Shrewsbury, MA 01545) **The in vivo and in vitro estrogenic activity of methoxychlor and its bis-phenolic analog 2,2-bis((BPHT) in the rat.** *Pharmacologist 08 19(2): 199;* 1977. (no references)

Methoxychlor is attractive as a replacement for DDT because of its short mammalian half life and its biodegradability. Methoxychlor increases rat uterine glycogen content and inhibits the binding of ^3H-E_2 to rat uterine cytosol. In both of these previous studies technical grade methoxychlor was more active than the further purified compound. Under the assumption that the active contaminant was phenolic, 99% pure methoxychlor was washed with base. The base-purified methoxychlor did not suppress ^3H-E_2 binding to the 8S-rat uterine cytosolic receptor (analyzed by sucrose gradient), while unpurified methoxychlor did suppress it. The base-soluble "phenolic fraction" and bishydroxyphenyl trichloroethane, a potential metabolite or contaminant of methoxychlor, greatly suppressed ^3H-E_2 binding. Both base-purified methoxychlor and bishydroxphenyl trichloroethane induce uterine ornithine decarboxylase, the latter more intensely. The lack of activity in vitro and the estrogenic effects

in vivo suggest that methoxychlor is a preestrogen, requiring demethylation for activity.

77- 2219. Baggett, J. McC. ; Klein, R. L.; Mehendale, H. M.; Thureson-Klein, A. K. (Univ. Mississippi Med. Cent., Jackson, MS 39216) **Acute kepone treatment of rats: a biochemical and ultrastructural study.** *Pharmacologist* 19(2): 199; 1977. (no references)

Kepone (chlordecone) was administered at 200 ppm in the diet to male Sprague-Dawley rats for 8 days. The animals were anesthetized and perfused-fixed, and the liver, adrenal glands, and interscapular brown adipose tissues were prepared for electron microscopic examination. Marked proliferation of smooth endoplasmic reticulum was seen in the hepatocytes, coincident with the induction of P-450 enzymes. The majority cell population (epinephrine) in the adrenal medulla contained mostly spherical granules, largely emptied, while the minority cell population (norepinephrine) became more prominent and contained mostly elongated granules which retained highly electron-dense matrix. Kepone caused a 40% decrease in adrenal catecholamine. This effect was specifically related to epinephrine, which decreased by more than half, while norepinephrine increased by 80%.

77- 2220. Hwang, E. C. ; Van Woert, M. H. (Mt. Sinai Sch. Med., New York, NY 10029) **DDT-Induced neurotoxic syndrome: animal model of myoclonus** *Pharmacologist* 19(2): 199; 1977. (no references)

Oral administration of *p,p'*-DDT to rats and mice at 600 mg/kg in olive oil produces spontaneous and stimulus-sensitive myoclonus, hyperactivity and tremor. Starting about 2 hr after DDT administration, the syndrome persists for 4-5 hr. Patients with action myoclonus have been found to have decreased levels of 5-hydroxyindoleacetic acid (HIAA) in their cerebrospinal fluid and to improve during therapy with L-5-hydroxytryptophan (HTP), a precursor of serotonin (5HT). Therefore the concentrations of 5HT and HIAA were measured in 7 brain regions of DDT-treated rats. DDT significantly increased both HIAA and 5HT levels in the midbrain (44% and 26% respectively), and HIAA was elevated by 30% in the striatum. Intraperitoneal injection of HTP, chlorimipramine, or a combination of the two decreased the myoclonus, hyperactivity, and tremor induced by DDT by 25%, 30%, and 72% respectively. The serotonin receptor blocker methysergide at 5 mg/kg increased the DDT-induced involuntary movements by 25%. Thus these neurological symptoms of DDT exposure may be related to inhibition of 5HT release into the synapse, resulting in a functional deficiency of this neurotransmitter at the receptor.

77- 2221. Kitchin, K. T. ; Woods, J. S. (Natl. Inst. Environ. Health Sci., NIH, Research Triangle Park, NC 27709) **TCDD induced synthesis of P-448 and aryl hydrocarbon hydroxylase (AHH) activity in female rat liver.** *Pharmacologist* 19(2): 232; 1977. (no references)

The mechanism of induction of cytochrome P-448 and aryl hydrocarbon hydroxylase (AHH) by tetrachlorodibenzo-*p*-dioxin (TCDD, dioxin), a potent mammalian hepatotoxin was examined. At 1, 3, 7, and 28 days after treatment, TCDD at 2 μg/kg po produced 23, 37, 45, and 13-fold increases in levels of cytochrome P-448-mediated ACTH in hepatic microsomes of female rats. No changes were seen in levels of δ-aminolevulinic acid synthesase, or in cytochrome P-450-mediated aminopyrine *N*-demethylase. Concurrent administration of cycloheximide (an inhibitor of cytoribosomal protein synthesis) at 2 mg/kg ip or cobalt chloride (a heme depletor) at 60 mg/kg sc reduced TCDD induced aryl hydrocarbon hydroxylase by 64% and 29% respectively. Studies in vitro revealed that a six-fold greater reconstitution of total microsomal apocytochromes with hemin and a 4.5-fold greater increase in levels occurred in homogenates from cobalt chloride and TCDD treated rats than from controls. Thus TCDD apparently induces the synthesis of apocytochrome P-448, which combines with heme to form new cytochrome P-448, and thus increases AHH activity.

77- 2222. Pelkonen, O. **Transplacental transfer of foreign compounds and their metabolism by the foetus.** *Progress in Drug Metabolism* Vol. 2, pp. 119-161; 1977. (262 references)

Aspects of the placental transfer of foreign compounds and their metabolism by the fetus are reviewed in terms of the drugs and other xenobiotics likely to be encountered and the mechanism by which they are handled in various species. The human fetus is exposed, via the maternal organism, to many foreign substances; correlation of this fact with observed fetal damage is extremely difficult. Harmful effects may be caused directly by the xenobiotic compound or by a more active metabolite. Pesticides are among the environmental pollutants that are being examined for harmful effects to the fetus. The ability of the human fetus to oxidize foreign compounds mainly resides in the liver and adrenal glands, which possess cytochrome P-450-linked electron-transport chains. Some conjugation reactions are well developed in the fetus during the first half of pregnancy, whereas glucuronic acid conjugation seems to be somewhat deficient. Drug metabolism develops much later in fetuses of common laboratory animals than in human fetuses, predominantly after birth. The ability of the human fetus to oxidize foreign compounds seems to closely parallel to active steroid-hydroxylation characteristic of the human fetus. Possible consequences of the fetal drug metabolizing capacity are accumulation of water-soluble metabolites, formation of toxic intermediates, and interactions between steroids and antibiotics.

77- 2223. Moroi, K. ; Kuga, T. (Inst. Biological Activity, Chiba Univ., Chiba, Japan) **[Enzyme induction by continued administration of tetrachlorvinphos, 2-chloro-1-(2,4,5-trichlorophenyl) vinyl dimethyl phosphate.]** *Rep. Inst. Biol. Activ., Chiba Univ.* 4: 26-27; 1976. (no references) (Japanese)

During continued administration of tetrachlorvinphos (CVMP) for 10 days to rats at dosages of 60 and 250

mg/kg, cholinesterase activity in brain, serum and erythrocyte initially dropped, then showed remarkable restoration with remarkable hypertrophy of the liver. The activity of hepatic drug metabolizing enzymes (aminopyrine demethylation and EPN detoxification) showed an increase for the first 7 days of administration. The former activity became 1.7 times the initial level and the latter activity 3.0 times at 250 mg/kg/day, with a liver weight 1.5 times that of controls. In order to compare the enzyme induction effectiveness of CVMP (250 mg/kg/day for 3 days) with that of phenobarbital (80 mg/kg/day for 3 days), CVMP was administered to rats pretreated with CVMP and phenobarbital. The results showed no inhibition of brain cholinesterase and remarkably restored serum and erythrocyte cholinesterase activity as compared to controls. The metabolic activity toward CVMP, determined on microsomes and their supernatant, was increased 7 fold by CVMP pretreatment and 1.2 fold by phenobarbital pretreatment.

77- 2224. Virgo, B. B. ; Bellward, G. D. (Univ. Windsor, Dep. Biol., Windsor, Ontario, Canada N9B 3P4) **Effects of dietary dieldrin on offspring viability, maternal behaviour, and milk production in the mouse** *Res. Commun. Chem. Pathol. Pharm.* 17(3); 399-409; 1977. (12 references)

Beginning 4 wk before mating primiparous mice were continuously supplied with diet containing 5, 10, or 15 ppm dieldrin. Pups were isolated from dams at birth; 35% of pups from dams fed control diet were alive 48 hr later, while 5, 10, and 15% dieldrin significantly reduced the survival to 18, 14, and 4% respectively. All of the pups taken from females fed 10 ppm dieldrin diet and nursed by foster-dams died by day 7, while 84% of the control pups survived until weaning. Serum progesterone levels in mice fed control diets were 41 and 62 ng/ml on days 8 and 14 of gestation respectively; these levels were not altered by dieldrin at 5, 10 or 15 ppm. Milk production and the dam's tendency to retrieve pups or build nests were not affected by 5 or 10 ppm dieldrin, while the nursing tendency was significantly affected (47% and 118% reductions respectively at 5 and 100 ppm).

77- 2225. Couch, J. A. ; Winstead, J. T.; Goodman, L. R. (U.S. Environ. Prot. Agency, Environ. Res. Lab., Gulf Breeze, FL 32561) **Kepone-induced scoliosis and its histological consequences in fish** *Science* 197(4303): 585-587; 1977. (8 references)

Scoliosis in fish is caused by several diverse agents that possibly act on the central nervous system, neuromuscular junctions, or ionic metabolism. The organochlorine pesticide Kepone (chlordecone) induces scoliosis in the sheepshead minnow. Some effects associated with Kepone-induced scoliosis in these fish are disruption of myotomal patterns, inter- and intramuscular hemorrhage, fractured centra of vertebrae, and death. The histological syndrome of Kepone poisoning in fish and the clinical syndrome in humans suggest that the nervous system is a primary target for Kepone and that scoliosis is a secondary effect of Kepone poisoning in fish. (Author abstract by permission)

77- 2226. Gupta, P. K. ; Gupta, R. C. (Ind. Toxicol. Res. Cent., M. G. Marg, P.O. Box 80, Lucknow, India) **Effect of endosulfan pretreatment on organ weights and on pentobarbital hypnosis in rats.** *Toxicology* 7(3): 283-288; 1977. (18 references)

The effects of endosulfan on the weights of the liver, adrenal and ovary, on pentobarbital blood and brain levels and on sleeping time (ST) have been investigated in female rats after daily oral doses of 0, 1.0, 2.5 and 5.0 mg/kg for a period of 7 or 15 days. No significant change in body weight was observed. With higher doses (2.5-5.0 mg/kg) the liver weight was significantly increased, but ovary and adrenal weights did not increase. Endosulfan treatment shortened sleeping time, while induction time was significantly increased. The concentration of pentobarbital in the blood and brain of rats after 30 min and upon awakening indicated that there was a significant decrease at 30 min. No change at awakening was observed in endosulfan-treated rats as compared to controls. It is suggested that endosulfan may shorten the duration of pentobarbital-induced sleep, perhaps by induction of hepatic microsomal enzyme activity. (Author abstract by permission)

77- 2227. Phillips, J. C. ; Hardy, K.; Richards, R.; Cottrell, R. C.; Gangolli, S. D. (British Ind. Biol. Res. Assoc., Woodmansterne Road, Carshalton, Surrey SM5 4DS Great Britain). **Studies of the metabolic fate of *p*-hydroxybenzoic acid in male and female cats.** *Toxicology* 7(3): 257-263; 1977. (9 references)

Metabolic studies conducted on *p*-hydroxybenzoic acid orally administered at dose levels of 13 and 26 mg/kg to male and female cats have shown that the compound is rapidly excreted in the urine exclusively in the form of the glycine conjugate *p*-hydroxyhippuric acid. Similar results were obtained following either single administration or 7-day treatment. The metabolite in the urine was characterized by thin-layer chromatography, amino acid analysis and mass spectrometry. (Author abstract by permission)

77- 2228. Levine, B. S. ; Murphy, S. D. (Harvard Univ., Kresge Cent. Environ. Health, Sch. Public Health, Dep. Physiol., Boston, MA 02115) **Esterase inhibition and reactivation in relation to piperonyl butoxide-phosphorothionate interactions** *Toxicol. Appl. Pharmacol.* 40(3): 379-391; 1977. (29 references)

The effect of piperonyl butoxide on the acute toxicity of phosphorothionate insecticides was studied in male mice. One hour after piperonyl butoxide (400 mg/kg), the toxicity of the dimethyl phosphorothionates, methyl parathion and guthion (azinphosmethyl), was antagonized, whereas the toxicity of their respective diethyl homologs, parathion and ethyl guthion (azinphosethyl), was potentiated. Piperonyl butoxide did not appreciably alter the toxicity of the oxygen analogs of these compounds. Preatreatment with SKF 525-A (50 mg/

kg) modified the toxicity of the phosphorothionates in a manner qualitatively similar to piperonyl butoxide pretreatment. Plasma concentrations of all four insecticides were increased three- to sevenfold in piperonyl butoxide-pretreated mice. This increase may result in a greater total oxon formation; however, reactivation *in vitro* of esterases inhibited *in vivo* was 5 to 10 times more rapid following methyl parathion or guthion challenge than after their diethyl homologs. Although a greater total oxon formation-cholinesterase inhibition is possible for both dimethyl and diethyl phosphorothionates following piperonyl butoxide pretreatment, rapid reactivation of inhibited nerve tissue cholinesterases after dimethyl phosphorothionate challenge appears to compensate for further inhibition occurring at a decreased rate. The net result would be a reduction in dimethyl phosphorothionate toxicity. In contrast, slow reactivation of inhibited nerve tissue cholinesterases following diethyl phosphorothionate challenge appears unable to compensate for increased oxon formation-cholinesterase inhibition. The net result is a potentiation of the toxicity of the diethyl-substituted compounds. (Author abstract by permission)

77- 2229. Levine, B. S. ; Murphy, S. D. (Harvard Univ., Kresge Cent. Environ. Health, Sch. Public Health, Dep. Physiol., Boston, MA 02115) **Effect of piperonyl butoxide on the metabolism of dimethyl and diethyl phosphorothionate insecticides** *Toxicol. Appl. Pharmacol.* 40(3): 393-406; 1977. (28 references)

Pretreatment with piperonyl butoxide (400 mg/kg) 1 hr prior to challenge antagonizes the toxicity of the dimethyl phosphorothionate insecticides, methyl parathion and guthion (azinphosmethyl), but potentiates the toxicity of the diethyl phosphorothionates, parathion and ethyl guthion (azinphosmethyl). The effect of piperonyl butoxide on the metabolism of phosphorothionates and their oxygen analogs was studied in livers from male mice in an attempt to correlate metabolism with toxicity. Oxidative desulfuration (activation) and oxidative cleavage of both dimethyl and diethyl phosphorothionates by liver homogenates *in vitro* was inhibited by piperonyl butoxide to approximately the same extent. Enzymatic hydrolysis of paraoxon and methyl paraoxon was unaffected by piperonyl butoxide. No appreciable metabolism of parathion, ethyl guthion, or their oxygen analogs by glutathione-requiring enzyme systems was observed. Glutathione-dependent detoxification of methyl parathion in mouse liver *in vitro* occurred irrespective of microsomal oxidase activity. In contrast degradation of guthion by glutathione-requiring enzyme systems only occurred during inhibition of oxidative metabolism. Furthermore, methyl paraoxon was rapidly metabolized by glutathione-dependent enzyme systems *in vitro*, whereas gutoxon did not appear to be detoxified by these enzymes. *In vivo* metabolism experiments suggested that methyl paraoxon was more rapidly detoxified than methyl parathion by glutathione-dependent enzymes. These results are consistent with the observation of a 40-fold antagonism of methyl parathion toxicity by piperonyl butoxide compared to the only three-fold antagonism of guthion toxicity. (Author abstract by permission)

77- 2230. Yang, K. H. ; Croft, W. A.; Peterson, R. E. (Univ. Wisconsin, Madison, WI 53706). **Effects of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin on plasma disappearance and biliary excretion of foreign compounds in rats.** *Toxicol. Appl. Pharmacol.* 40(3): 485-496; 1977. (27 references)

Plasma disappearance and biliary excretion of ouabain, phenol-3,6-dibromophtalein (DBSP), and sulfobromophthalein (BSP) were determined in rats, 2, 10, 20, 25, or 40 days after oral administration of a single dose of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD), 10 or 25 μg/kg. Treatment with either dose of TCDD increased the plasma concentration of ouabain and decreased its excretion into bile. Both effects could be detected 2 days after TCDD and reached a peak between 10 and 20 days, and a slight recovery trend was seen at 40 days. The magnitude of the depression in ouabain excretion was directly related to the dose of TCDD. Plasma disappearance and biliary excretion of DBSP and BSP were affected differently by TCDD treatment than was ouabain. The low dose of TCDD enhanced initial biliary excretion of DBSP and BSP 25 days after TCDD. On the other hand, the high dose depressed biliary excretion and increased the plasma concentration of the dyes at 10 days. The depression in DBSP and BSP biliary excretion after the dose of TCDD was of lesser magnitude and shorter duration than that of ouabain, being fully recovered after 25 days. Both doses of TCDD decreased body weight and increased liver wet weight. Bile flow was decreased by TCDD and the magnitude of depression was directly related to the dose of TCDD. The time course of the depression in bile flow was similar to that for the depression in ouabain excretion. Light microscopic examination of the liver 10 and 20 days after TCDD revealed swelling and occasional necrosis of individual hepatocytes and aggregations of mononuclear inflammatory cells in periportal areas. Our findings reveal that TCDD depresses the biliary excretion of ouabain in a dose-related manner and emphasize the long duration of the effect. (Author abstract by permission)

77- 2231. Kuiper-Goodman, T. ; Grant, D. L.; Moodie, C. A.; Korsrud, G. O.; Munro, I. C. (Food Directorate, Health Prot. Branch, Natl. Health Welfare, Ottawa, Ontario, Canada K1A 012) **Subacute toxicity of hexachlorobenzene in the rat** *Toxicol. Appl. Pharmacol.* 40(3): 529-549; 1977. (48 references)

Male and female rats of the Charles River strain were fed a commercial diet supplemented with 5% corn oil. Hexachlorobenzene (HCB) was added to the corn oil to give 0, 0.5, 2, 8, or 32 mg of HCB/day/kg/body weight. Subgroups of four rats of each sex were killed at 3, 6, 9, 12, and 15 weeks of feeding. To measure the reversibility of changes noted and the decline of HCB residues, the rats remaining at 15 weeks were fed an HCB-free diet and subgroups were killed after 1, 2, 4, 7, 16, and 33 weeks. Tissue residues of HCB reached a platueau before 15 weeks and were dose related, with concentrations adipose tissue liver brain serum. In both sexes at the two highest dose levels, relative liver weight was increased when compared to control rats for most of the treatment

period. Histopathological changes were confined to the liver and spleen. In the liver, there was an increase in the size of centrilobular hepatocytes. Serum sorbitol dehydrogenase activity, an indicator of liver damage, was maximally increased at 6 weeks at the highest dose level in males. Histochemically, this was related to a depletion of this enzyme in the liver. A change in distribution of other enzymes in the liver also was noted. Females developed porphyria, with high porphyrin values persisting after the rats were placed on the HCB-free diet. Pathological examination of the other organs indicated no changes. Females were more sensitive than males to the toxic effects of HCB. The overall results indicated a sex difference in the response to HCB. (Author abstract by permission)

77- 2232. Jensen, K. I. N. ; Stephenson, G. R.; Hunt, L. A. (Agric. Canada, Res. Stn., Kentville, Nova Scotia, B4N 1J5, Canada) **Detoxification of atrazine in three gramineae subfamilies** *Weed Sci.* 25(3): 212-220; 1977. (32 references)

Inhibition and subsequent recovery of net CO_2 exchange (NCE) by single leaves of 53 grass species of the subfamilies Festucoideae, Panicoideae, and Eragrostoideae was monitored following limited root uptake of atrazine [2-chloro -4- (ethylamino) -6- (isopropylamino)-*s*- triazine]. Rates of NCE recovery were correlated with rates of ^{14}C-atrazine metabolism in leaf sections of festucoid and panicoid grasses but not eragrostoid grasses. Rates of NCE recovery among the nine festucoid and 12 eragrostoid species tested did not exceed 0.2 and 1.1 mg CO_2 per dm^2 per hr/hr, respectively, whereas for the 31 panicoid species, it ranged from 0.2 to 2.4 mg CO_2 per dm^2 per hr/hr. Selected species exhibiting NCE recovery rates exceeding 1.2 mg CO_2 per dm^2 per hr/hr were tolerant to 1.0 kg/ha preemergence and 1.25 kg/ha postemergence atrazine applications. These panicoid species included a number of common weed species belonging to the genera *Digitaria, Panicum,* and *Setaria,* as well as species belonging to *Bracharia, Pennisetum, Sorghum,* and *Zea.* Unchanged ^{14}C-atrazine accounted for 11.3 to 92.7% of the total ^{14}C-radioactivity extracted from ^{14}C-atrazine infiltrated leaf sections following an 8-hr incubation period. N-dealkylation, hydroxylation, and peptide conjugation occurred in all species, although rates of these metabolic pathways varied widely among species. Recovery of NCE was correlated with formation of the glutathione-atrazine conjugate, and conjugation was the major detoxification pathway in species exhibiting tolerance to atrazine. (Author abstract by permission)

77- 2233. Radosevich, S. R. (Univ. Calif., Dep. Bot., Davis, CA 95616) **Mechanism of atrazine resistance in lambsquarters and pigweed** *Weed Sci.* 25(4): 316-318; 1977. (12 references)

Studies were conducted to determine the effect on absorption and metabolism of atrazine [2-chloro- 4-(ethylamino)- 6-(isopropylamino)- *s*-triazine] by atrazine- susceptible (S) and -resistant (R) biotypes of common lambsquarters (*Chenopodium album* L.) and redroot pigweed (*Amaranthus retroflexus* L.). The response of isolated chloroplasts of susceptible and resistant biotypes of each species was also studied. In both species the two biotypes absorbed atrazine equally well and were unable to differentially metabolize the herbicide. The photochemical activity of R chloroplasts isolated from each species was not inhibited by atrazine but S chloroplasts were severely inhibited. (Author abstract by permission)

77- 2234. Cerey, K. ; Szokolayova, J.; Rosival, L. (Res. Inst. Hyg., Bratislava, Czechoslovakia) **Influence of pesticides on the length of the oestrous cycle of Wistar laboratory rats** *Z. Versuchstierk.* 19(1-2): 98; 1977. (no references)

Estrous cycle changes were followed in female Wistar rats using smears prepared daily from the vaginal mucosa of experimental and control animals. Effects of two organochlorine pesticides (lindane and heptachlor), one organophosphate (fenitrothion), and one contaminant (*S*-methylfenitrothion) were examined on the estrous cycle. All of these substances blocked the estrous cycle for 1-2 cycles after the beginning the administration, depending on the stage of the cycle at which the beginning of administration occurred. After this phase the estrous cycle was shortened to lower values than in the control group.

77- 2235. Gross-Selbeck, E. ; Bornhausen, M. (Inst. Exp. Anim. Studies, Free Univ. Berlin, Tietzenweg 85/87, Berlin, (West) 45, Germany) **Operant conditioning in rats as a method for the detection of behavioural changes induced by environmental chemicals** *Z. Versuchstierk.* 19(1-2): 103; 1977. (no references)

A behavioral analysis method was developed to assess adverse effects of environmental chemicals on experimental animals. Rats were trained in a first series of experiments within different instrumental conditioning schedules to respond to a fixed ratio of bar presses to reinforcement. Animals were isolated from extraneous stimuli in Skinner boxes. The changes in individual behavior patterns based on saturation reinforcement were studied, among other factors, for the phenylurea herbicides buturon and monolinuron. The sensitivity of the method was increased by using intracranial self-stimulation as reinforcement. In this procedure electric stimuli are delivered to the subcortical structures of the brain by chronic implantation of stereotactic electrodes.

77- 2236. Berencsi, G. ; Nagymajtenyi, L. (Inst, Hyg. Epidemiol., Szeged Med. Univ., Hungary) **Ueber Lungenschaedigung bei der Maus durch per os chronisch aufgenommene Substanzen [Pulmonary injury of mice produced by chronic peroral treatment with different substances.]** *Zentralbl. Bakteniol. Parasiterkd. Infektionskr. Hyg., I. Abt. Orig. B.* 164(3): 282-287; 1976. (31 references) (German)

Mice were given 1/100 LD50 doses of paraquat twice per week for six weeks via stomach tube. Then the animals were sacrificed and dissected; the lungs were embedded in

paraffin, sectioned, and stained. The general condition of the animals deteriorated during the experiment. The macroscopic appearance of the lungs was practically normal except for dense, nodular spots. Microscopic examination of these spots revealed thickening of the pleural epithelium and infiltration of the interstitial tissue by monomuclear epithelioid cells. The alveoli were filled with round cells which had foamy protoplasm. The capillaries were dilated, and interstitial hemorrhage and edema were apparent. The infiltrated tissue contained some giant cells and some hemosiderin-like pigment particles were present in lung tissue. Cell proliferation was so dense at some points that the alveoli were completely collapsed. These findings were compared with those obtained following oral administration of small doses of beryllium sulfate, chromium sulfate, cadmium sulfate, and nickel sulfate. These substances caused pulmonary infiltration, but the lung damage was not as severe as that caused in other organs.

See also **77-2242** **77-2119** **77-2120** **77-2121** **77-2122** **77-2176** **77-2187** **77-2206**

77- 2237. Bees, R. C. ; Irgolic, K. J.; Flannery, J. E.; Ridgway, T. H. (Dep. Chem., Texas A & M Univ., College Station, TX 77843) **Polarographic reduction of aromatic arsonic and arsinic acids** *Anal. Lett.* 10(5): 415-421; 1977. (10 references)

Arsonic and arsinic acids, used in herbicides and animal feeds, can be determined polarographically. The aromatic arsonic acids studied (phenyl, benzyl, and 2-phenylethyl arsonic acids) have first dissociation constants in the range of 3.0 to 4.0, and therefore KCl-KCl buffers with pH of 1.10 to 2.0 were used. Complex adsorption processes were associated with these arsonic acids. Since the dissociation constants for the aromatic arsinic acids are in the range of 4.0 to 6.0, the same KCl-HCl buffers were used. Triton-X was added to these solutions to minimize adsorption problems. Detection limits for the aromatic arsonic acids were 0.25-0.52 ppm, and for the aromatic arsinic acids 0.1 - 0.14 ppm. The peak potentials of the acids are generally sufficiently different to allow determination of the individual compounds in mixtures containing only arsonic acids, arsinic acids, or both.

77- 2238. Ishiguro, T. ; Mikazuki, K.; Miyazono, M.; Katagiri, K. (Aburahi Lab., Shionogi Seyaku Co., Ltd., Koka, Japan). **[Experiments on serological method for identification of B. thuringiensis.]** *Bochu Kagaku (Sci. Pest Contr.)* 42(2): 75-81; 1977. (8 references) (Japanese)

Microbial insecticides based on *Bacillus thuringiensis* have been developed, and their quality control is carried out by biological assay on silkworms. A mixed formulation was made from two strains, and it became necessary to identify the bacilli and to elucidate the ratio of admixture as well as the activity. By an antigen-antibody reaction utilizing H-antigen based on Norris's method, the quantitative identification of *B. thuringiensis* var. aizawai and *B. thuringiensis* var. kurstaki was attempted. In a slide coagulation reaction using absorption serum both strains clearly showed reactivity; however, a difference in auto-coagulation was recognized. *B. thuringiensis* var. aizawai showing strong autocoagulation on a usual culture medium and on Mueller-Hinton medium, while *B. thuringiensis* var. kurstaki did not show autocoagulation on Mueller-Hinton Medium. In an admixed colony which developed from the mixture of dry cultures of both strains and which developed from the formulation, the two strains could be identified. It was also found that the ratio of the two in the formulation could be calculated.

77- 2239. Levin, J. O. ; Nilsson, C. A. (Natl. Board Occup. Saf. Health, Dep. Occup. Health Umea Chem. Div., S-901 85 Umea, Swed.) **Chromatographic determination of polychlorinated phenols, phenoxyphenols, dibenzofurans and dibenzodioxins in wood-dust from worker environments.** *Chemosphere* 6(7): 443-448; 1977. (11 references)

Workers in wood processing industries are exposed to wood dust containing the fungicides used as wood preservatives as well as the accompanying impurities and degradation products. Wood dust samples were collected from different positions in a trimming-grading plant, the dust was extracted with ether, and the chlorinated compounds were separated by silica gel TLC. With the solvent system used most of the chlorophenoxyphenols have the same Rf value and elute as one band, and the neutral compounds as another. The bands were then analyzed by gas chromatography; the phenolic compounds were first methylated. Dust from one sawmill in which a sodium 2,3,4,6-tetrachlorophenol formulation was used as the fungicide contained 100-800 ppm 2,3,-4,6-tetrachlorphenol, 30-400 ppm pentachlorophenol, 10-50 ppm chlorophenoxyphenols, 1-10 ppm chlorodibenzodifurans, and less than 0.5 ppm chlorodibenzodioxins. The use of chlorophenols as wood preservatives is prohibited in sweden as of 1978.

77- 2240. Stan, H. J. (Inst. Lebensmittelchem., Techn. Univ., D-1000 Berlin 12, Germany) **Nachweis von Phosphorpestizidrueckstaenden in Lebensmitteln durch Kapillar-Gas-Chromatographie—Massenspektrometrie [Detection of organophosphorus pesticide residues in food by open-tubular-column gas chromatography-mass spectrometry.]** *Chromatographia* 10(5): 233-239; 1977. (6 references) (German)

A GC/MS computer system was developed and applied for identifying organophosphorous pesticide residues in fruit and vegetables. Residues were extracted according to a previously described procedures, except that the final extract produced by dissolving the evaporation residue in benzene was ten times more highly concentrated. The column used was a thin film glass capillary, 20 m long and 0.33 mm i.d., coated with SE45. The carrier gas was helium at a flow rate of 2.8 cm^3/min, and the injection temperature was 235°. A linear temperature program was used following preheating to 120 C. The final hold temperature was 220 C. The carrier gas stream was admitted directly into the ion source of a quadrupole mass spectrometer connected with an integrated data system. A satisfactory separation of the critical group of fenthion, parathion, and bromophos was achieved, and azinphosethyl, the last pesticide of the 12 tested, eluted from the column after 31 min. Potentially interfering materials from cherries were present in the extracts only in very small quantities, and the pthalate estes detected (probably eluted from plastics) did not interfere in the anlayses. Cauliflower extract contained more interfering materials, but the method still permitted localization of the organophosphate peaks.

77- 2241. Niwwase, T. (Author address not given) **[A proposed method of determining pesticidal *N*-methylcarbamates.]** *Eisei Kagaku (J. Hyg. Chem.)* 23(3): 173-174; 1977. (Japanese)

A gas chromatographic method of determining *N*-methylcarbamate insecticides was described. An aliquot of 0.3 - 1 microliter of the solution of specimen containing 3 mg of the specimen per ml of ethyl acetate was injected into a gas chromatograph containing silane-treated Chromsorb W(80-100 mesh) coated with either 2% OV-17, 1% OV-1 or 1% SE-30. The flow of carrier gas, N_2, is 30 or 35 mg/min. The column temperature is 105 C, and it is increased to 125 C at a rate of 20 C/min in case of 2% OV-17, 136 C in the

case of 1% OV-1, and 122 C in the case of 1% SE-30. The inlet temperature is 200 - 210 C. The gas chromatograph with equipped with a hydrogen flame ionization detection. The low detection limit of the *N*-methylcarbamates was as follows: 2-chlorophenyl-, 0.01; *m*-tolyl-, 0.02; 2-isopropoxyphenyhl-, methomyl, 0.05; 0.01; 3,5-xylyl-, 0.02; 2-isopropyphenyl-, 0.02; 3,4-xylyl-, 0.02; 2-sec-butylphenyl; 0.2; and of toxamate, 0.1; 2-diallylamino 3,5-dimethylphenyl carbaryl, 0.1; microgram. When 2% OV-17 was used, the retention times of these *N*-methylcarbamates were 3.0, 4.3, 6.8, 7.0, 7.7, 8.2, 11.3, 4.9, 66.0 31.0, 35.0 min in the above described order.

77- 2242. Nakamura, A. (Author address not given) **[A proposed method of determining a garment treating agent. Part 2. Dieldrin.]** *Eisei Kagaku (J. Hyg. Chem.)* 23(3): 135-136; 1977. (2 references) (Japanese)

A gas chromatographic method of determining dieldrin in/on garment samples was described. Finely divided specimen was extracted with methanol under a reflux condenser for 30 min; then 250 ml of the extract was condensed to 5 ml under reduced pressure. If substances that interfere in gas chromatography are present the condensed filtrate is dried completely at a temperature lower than 50 C. The solid residue is dissolved in 10 ml of hexane containing 15% ether, then the solution column-chromatographed on florisil. The eluate (300 ml of hexane containing 15% ether) was condensed to 5 ml under reduced pressure and the condensate was injected into the gas chromatograph. The lower limit of detection by the method is 0.01 ppm. Wool may originally contain dieldrin derived from the feed of the sheep, and therefore, a positive result does not necessarily mean that the wool fabrics were processed with dieldrin.

77- 2243. Hieke, E. ; Kreisel, A. (Chem. Untersuchungant, D-6500 Mainz, Germany) **Automated analysis of beverages, in particular wine. Part II. Automatable colorimetric determination of total sulphurous acid in grape must and wine, compared with the official method.** *Fresenius Z. Anal. Chem.* 285(1): 39-42; 1977. (7 references)

A previously published method for the colorimetric determination of sulphurous acid, including that in wine, is based on the formation of a triphenylmethane dye using pararosaniline. This method was studied, modified and compared with the official method. The colorimetric method is specific and the wine components and technological additives examined here do not interfere. The comparative results of the official and colorimetric methods (at least in the range 200-400 mg/l) are only coincidently different. The recovery rate of the colorimetric method is higher than that of the official method. The colorimetric method can be automated. (Author abstract by permission)

77- 2244. Tewari, S. N. ; Harpalani, S. P. (Toxicol. Div., Chem. Examiner's Lab., Agra, India) **Detection and determination of dichlorvos (DDVP) in toxicological analysis.** *Fresenius Z. Anal. Chem.* 285(1): 48; 1977. (no references)

Thymol blue can be employed for specific TLC detection and determination of dichlorvos. The sample is homogenized by heating with sodium sulfate, sulfuric acid, and acetone, then extracted with chloroform, dried, and redissolved in acetone. Sample and standards are chromatographed on silica gel plates with 0.5% thymol blue in ethanol. Formation of a violet color against a yellow background indicates the presence of dichlorvos. The limit of detection was 0.2 μg. Trichlorfon also gives a violet spot, but reacts in the pyridine alkali test, while dichlorvos does not. Other organophosphate and organochlorine insecticides tested did not interfere.

77- 2245. Young, J. C. ; Khan, S. U.; Marriage, P. B. (Chem. Biol. Res. Inst., Ottawa, Ontario, Canada). **Fluorescence detection and determination of glyphosate via its *N*-nitroso derivative by thin-layer chromatography.** *J. Agric. Food Chem.* 25(4): 918-922; 1977. (35 references)

A sensitive, selective, and simple procedure is described for the analysis of the herbicide glyphosate. The method involves aqueous extraction of glyphosate from the sample, in situ preparation of the *N*-nitroso derivative with sodium nitrite at pH 3.0, thin-layer chromatographic separation on silica gel, degradation of *N*-nitrosoglyphosate to aminomethylphosphonic acid with ultraviolet light, and fluorophore formation from this primary amine with fluorescamine. As little as 10 ng (45 pmol) of glyphosate could be detected, and with a minimum of sample cleanup 5 ppm was easily determined in 2-mg samples of the one plant investigated. Roots taken 1, 3, or 6 days after treatment of Canada thistle leaves with 40 mg of glyphosate per plant showed residue levels of 30-60 ppm. Recoveries in spiked samples ranged from 75% at 5 ppm to 90% at 100 ppm, and the precision of the determinations was about 9%. (Author abstract by permission)

77- 2246. Heck, H. A. ; Dyer, R. L.; Scott, A. C.; Anbar, M. (Stanford Res. Inst., Mass Spectrom. Res. Cent., Menlo Park, CA 94025) **Determination and disposition of trifluralin in the rat. Separation by sequential high-pressure liquid chromatography and quantitation by field ionization mass spectrometry.** *J. Agric. Food Chem.* 25(4): 901-908; 1977. (26 references)

A methodology for analysis of the herbicide, trifluralin, in animal tissues and excreta was developed using stable isotope dilution and field ionization mass spectrometry. Separation of the compound from the tissues was performed by sequential high-pressure gel permeation and reversed-phase liquid chromatography. The technique was applied to rat tissues following intraperitoneal injection or chronic oral administration of the herbicide. A two-compartment pharmacokinetic model is used to describe the uptake and disappearance of trifluralin in liver and fat following injection. (Author abstract by permission)

77- 2247. Brauhn, J. L. ; Schoettger, R. A. (Bur. Sport Fish. Wildl., Columbia, MO) **Acquisition and culture of research fish: Rainbow trout, fathead minnows, channel catfish, and bluegills.** *Natl. Tech. Inform. Serv.* PB-243-012, 55p.; 1975. (no references)

Rainbow trout (Salmo gairdneri), channel catfish (Ictalurus punctatus), fathead minnows (Pimephales promelas), and bluegills (Lepomis macrochirus) are cultured widely for toxicological research. However, vacillant or extreme cultural conditions are sometimes suspected of compromising the test animals and, thus, results of comparative or confirmatory research. Because exact optimum conditions for indoor maintenance and cultural of the four species are not well defined, standarized practices have benn adopted that are intended to reduce cultural conditions to a common variable status. Water quality, nutrition, genetic variation, diseases, fish handling, gross behavior, and required facilities are discussed. Well known propagation techniques provide the basis for the intensive care methods used. Special emphasis is given to diets, diet preparation, and residues of pesticides or other contaminants in diets and fish. (Author abstract by permission)

77- 2248. Going, J. ; Long, S. (Midwest Res. Inst., Kansas City, MO) **Sampling and analysis of selected toxic substances. Task II-Ethylene dibromide.** *Natl. Tech. Inform. Serv.* PB-246,213, 39p.; 1975. (no references)

Ethylene dibromide has recently been reported by the National Cancer Institute to be a potential carcinogen. Its commercial use is predominately as a scavenging agent for lead in gasoline. A minor usage is a pesticide fumigant. A protocol was developed for the sampling and analysis of ethylene dibromide in ambient air and surface water. The range in concentration of ethylene dibromide in the air and the site where it was collected are as follows: manufacturing sites, 4.2 to 115 micrograms per cu m oil refinery, 0.23-1.65 micrograms per cu m; urban locations near retail gasoline stations and with heavy vehicular traffic, 0.069 to 0.11 micrograms per cu m. Two water samples collected from streams near an oil refinery and a manufacturing site were found to contain 1.:3 and 1.05 parts per billion ethylene dibromide, respectively. Further work to clarify ambient air levels and to assess whether they may represent a health risk is anticipated, but the very low levels detected to data are not thought to present a significant risk to health. (Author abstract by permission)

77- 2249. Alford, A. L. (SE Environ. Res. Lab., Athens, GA) **Environmental applications of advanced instrumental analysis: Assistence projects FY 74.** *Natl. Tech. Inform. Serv.* PB-247-056, 39p.; 1975. (no references)

The Analytical Chemistry Branch of the Southeast Environmental Research Laboratory identified and measured aquatic pollutants under seven projects in answer to requests for assistance from other EPA organizations and other government agencies. In most cases these analyses helped to solve, or at least to understand more clearly, the related pollution incident and in some cases provided evidence for enforcement of regulatory legislation. Under an additional project, analytical consultations were held as requested by various organizations concerned with pollution incidents. (Author abstract by permission)

77- 2250. Mayer, R. T. ; Jermyn, J. W.; Burke, M. D.; Prough, R. A. (Vet. Toxicol. Entomol. Res. Lab., Agric. Res. Serv., College Station, TX 77840) **Methoxyresorufin as a substrate for the fluorometric assay of insect mirosomal** *Pestic. Biochem. Physiol.* 7(4): 349-354; 1977. (19 references)

The methoxy, ethoxy, propoxy, and butoxy homologs of resourufin were synthesized. They were tested as substrates for the fluorometric assay of *O*-dealkylation by the mixed-function oxidase system in house flies, *Musca domestica* L. Because of its favorable reaction rates, methoxyresorufin proved to be the most suitable substrate. This assay is sensitive and can be performed in 5 min or less with a small quantity of microsomal protein, less than 0.3 mg/ml/ The apparent Km was 2.88 μM, and the maximum velocity was 0.27 nmole of resorufin produced/min/mg of microsomal protein. The *O*-dealkylation reaction was inhibited by CO, and it required O_2 and NADPH.

77- 2251. Proszynska, B. (Dep. Anal. Food Commodities, Natl. Inst. Hyg., Warsaw, Poland) **Metoda oznaczania pozostalosci despirolu w ziemniakach. [Method of determining despirol residues in potatoes.]** *Roczn. Panstw. Zakl. Hig.* 28(2): 201-207; 1977. (13 references) (Polish)

Despirol (kelevan) and its metabolite, chlordecone, were identified by thin-layer chromatography in potatoes. The potatoes were extracted with methylene chloride, and the extracts were cleaned up on an acid aluminum oxide column. Kelevan was eluted with benzene and chlordecone was eluted with methanol following washing of the column with chloroform. The chromatoplate, coated with silica gel, was developed in a solvent system containing ethyl ether:hexane:acetone (12:8:0.5). Methanolic silver nitrate solution was used as detection reagent, and the color was developed with ultraviolet light. The detection limit for kelevan was 0.3 mg/kg and for chlordecone, 0.2 mg/kg. Kelevan was determined quantitatively by gas chromatography after oxidation to chlordecone using an anhydroous chromic acid solution in glacial acetic acid. The gas chromatographic detection limit was 0.005 mg/kg. The gas chromatographic procedure employed an electron capture detector and a column 2 m long and 3 mm in diameter packed with 3% SE-30 on 100-120 mesh diatomite. The carrier gas used was argon at a flow rate of 60 cm^3/min, the column temperature was 193 C, detector temperature 220 C, and injection temperature 220 C.

77- 2252. Zadrozinska, J. (Dep. Food Commodities Anal. Natl. Inst. Hyg., Warsaw, Poland) **Metoda oznaczania bromofosu, diazinonu i metylopirymifosu w owocach i warzywach. [Method of determining bromophos, diazinon, and methylpyrimifos in fruits and vegetables.]** *Roczn. Panstw. Zakl. Hyg.* 28(1): 69-78; 1977. (18 references) (Polish)

Using thin-layer chromatography with enzymatic de-

tection bromophos, diazinon, and methylpyrimifos as well as their oxons were determined in cherries, apples, raspberries, plums, garden strawberries, cabbages, carrots, cucumbers, tomatoes, and lettuce. Compounds were extracted with chloroform; the extracts were cleaned up on activated charcoal, separated by thin-layer chromatography, and identified enzymatically on the chromatograms, by enzyme inhibition. The enzyme used was obtained from bovine liver, and the substrate was beta-naphthyl acetate with fast blue salt B. The tested compounds could be identified in the presence of other oeganophosphate insecticides. The detection limits ranged from 0.005 to 0.02 mg/kg of fruits and vegetables. Bromophos and diazinon were detectable only at higher concentrations in cabbage and carrot, i.e., 0.1 and 0.05 mg/kg in cabbage and 0.2 and 0.1 mg/kg in carrot.

77- 2253. Konjevic, N. ; Orlov, M.; Tritica, M. (Inst. Apply. Phys., Belgrade, Yugoslavia) **Laser intra-cavity technique for detection of traces of insecticides** *Spectrosc. Lett.* 10(5): 311-317; 1977. (10 references)

A study was performed to demonstrate the possibility of using a tunable CO_2 laser for detecting some insecticides with characteristic absorption maxima in the wavelength range of the CO_2 laser. Mechanical stability of the laser system during measurements is extremely important and was improved by mounting the whole laser on a granite block . In this manner the power output of the laser system at constant power input would depend solely on the insecticide concentration in the intracavity absorption cell. Results from the laser were calibrated by GLC determinations of the insecticide concentrations in air.Parathion, demeton, and dichlorvos were detectable at 10-100 g/liter of air by monitoring laser output. The wavelength range of the laser may be extended over the range of 9.0 to 11.4 mm by using carbon and oxygen isotopes in the CO_2 molecular to detect various insecticides.

77- 2254. Ranfft, K. ; Blos, G. (Bavarian Main Agric. Res. Stn., D-8050 Freising-Weihenstephan, Germany) **Zum Bestimmung von Chlor kohlenwasserstoff-Pestizidrueckstaenden mittels Kapillar-Gaschromatographie. [Determination of chlorinated hydrocarbon pesticide residues by capillary chromatography.]** *Z. Lebensm. Unters.-Forsch* 164(1): 17-20; 1977. (2 references) (German)

A mixture of 15 organochlorine pesticides was successfully resolved by an open-column gas chromatographic technique. The test material is triturated with anhydrous sodium sulfate and sea sand, then soxhlet-extracted with diethyl ether. The extract is cleaned up on alumina and the pesticides determined in the eluate. The capillary column, 30 m long and 0.3 mm i.d., was packed with OV-61. The carrier gas used was hydrogen at a pressure of 0.28 bar, and an electron capture detector was used. The column temperature was increased at a programmed rate. Direct injection by the cold-flashing method was used, so that the test materials accumulate at the beginning of the column until the programmed temperature increase begins. Analysis is complete after 55 min if methoxychlor is present, or otherwise earlier. Despite a large number of interfering components, analysis of pesticides in hog feed was also possible. Detection limits ranged from 0.0002 to 0.005 ppm for a 10 g sample, and the coefficients of variation of the individual values were between 1.33 and 6.6%.

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